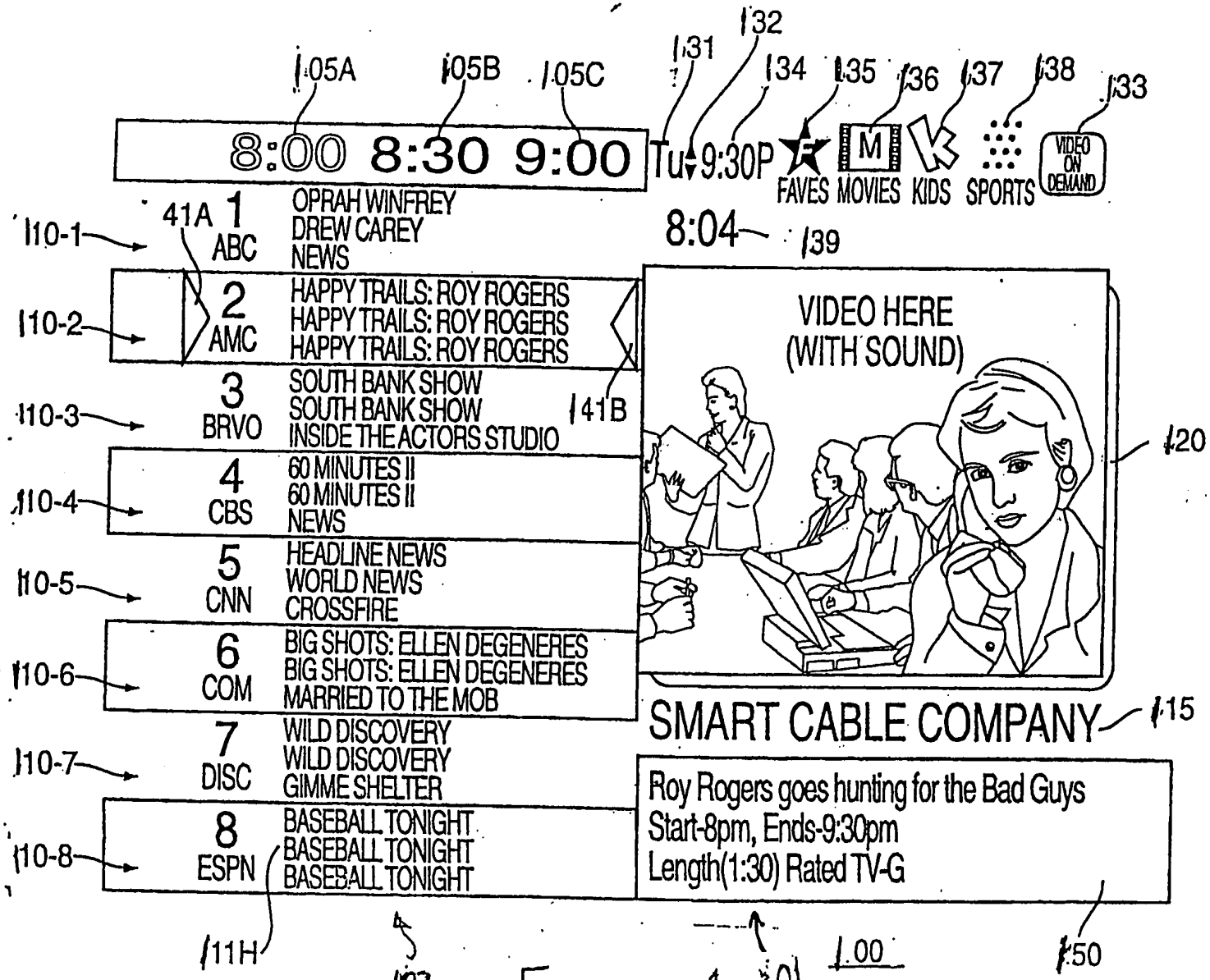

105A
105B
105C
131
132
134
135
136
137
138
133
8:00 8:30 9:00
Tu 9:30P
FAVES
MOVIES
KIDS
SPORTS
VIDEO ON DEMAND
41A
110-1
1 ABC
OPRAH WINFREY
DREW CAREY
NEWS
8:04
139
110-2
2 AMC
HAPPY TRAILS: ROY ROGERS
HAPPY TRAILS: ROY ROGERS
HAPPY TRAILS: ROY ROGERS
VIDEO HERE
(WITH SOUND)
110-3
3 BRVO
SOUTH BANK SHOW
SOUTH BANK SHOW
INSIDE THE ACTORS STUDIO
141B
120
110-4
4 CBS
60 MINUTES II
60 MINUTES II
NEWS
110-5
5 CNN
HEADLINE NEWS
WORLD NEWS
CROSSFIRE
110-6
6 COM
BIG SHOTS: ELLEN DEGENERES
BIG SHOTS: ELLEN DEGENERES
MARRIED TO THE MOB
SMART CABLE COMPANY
115
110-7
7 DISC
WILD DISCOVERY
WILD DISCOVERY
GIMME SHELTER
110-8
8 ESPN
BASEBALL TONIGHT
BASEBALL TONIGHT
BASEBALL TONIGHT
Roy Rogers goes hunting for the Bad Guys
Start-8pm, Ends-9:30pm
Length(1:30) Rated TV-G
111H
102
101
100
150

Figure 1

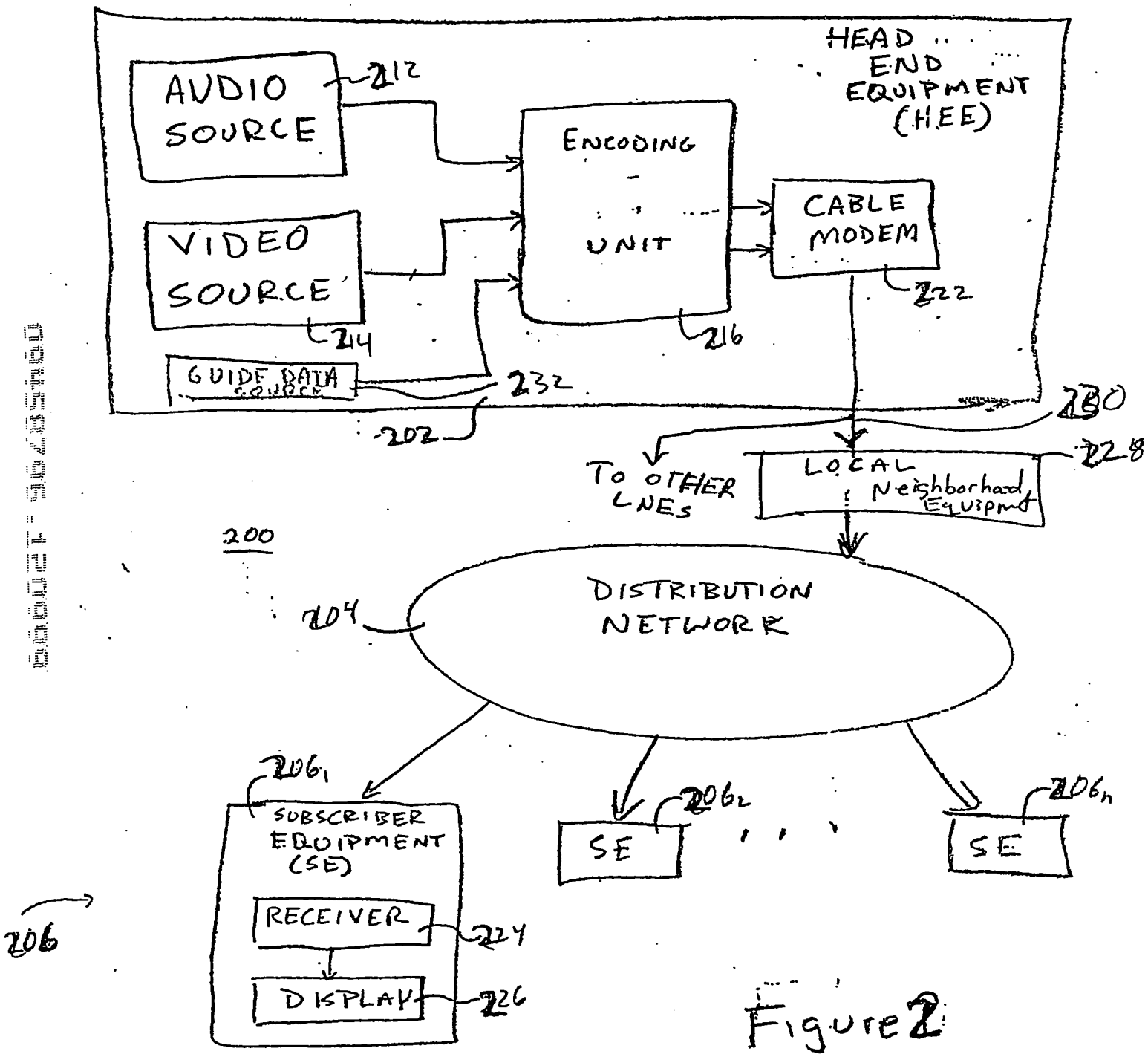

HEAD END EQUIPMENT (HEE)
AUDIO SOURCE
212
VIDEO SOURCE
214
GUIDE DATA SOURCE
232
202
ENCODING UNIT
216
CABLE MODEM
222
230
TO OTHER LNEs
LOCAL Neighborhood Equipmt
228
200
DISTRIBUTION NETWORK
204
206₁
SUBSCRIBER EQUIPMENT (SE)
RECEIVER
224
DISPLAY
226
206
SE
206₂
SE
206ₙ

Figure 2

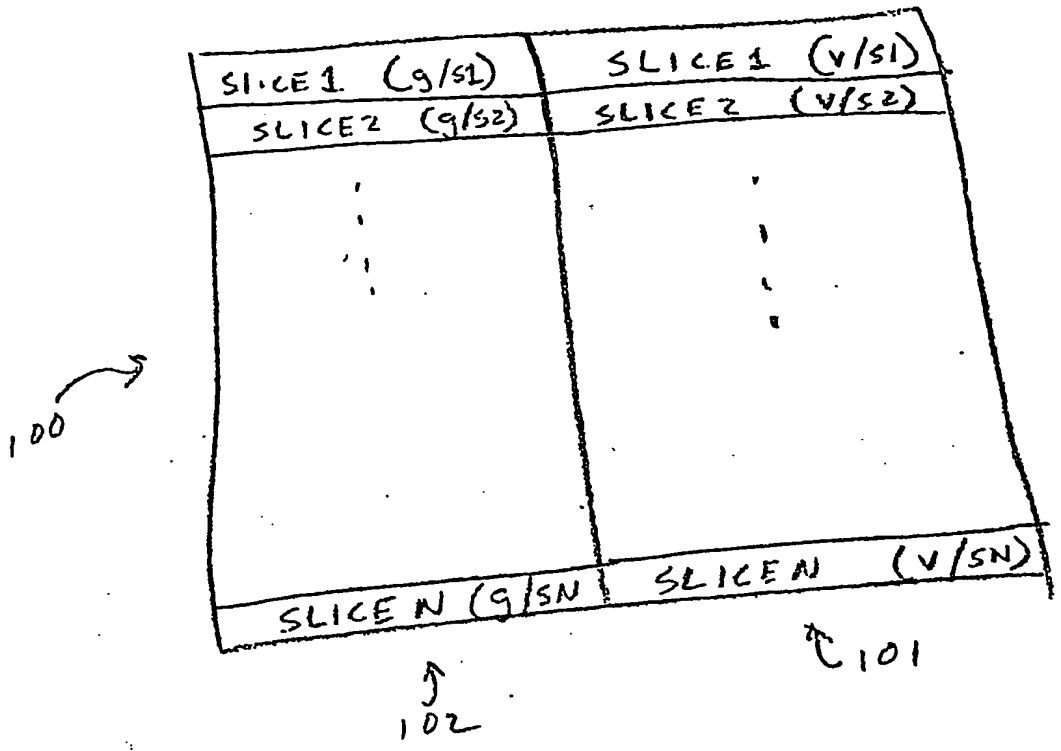

SLICE 1 (G/S1)
SLICE 1 (V/S1)
SLICE 2 (G/S2)
SLICE 2 (V/S2)
SLICE N (G/SN
SLICE N (V/SN)
100
101
102

FIGURE 3

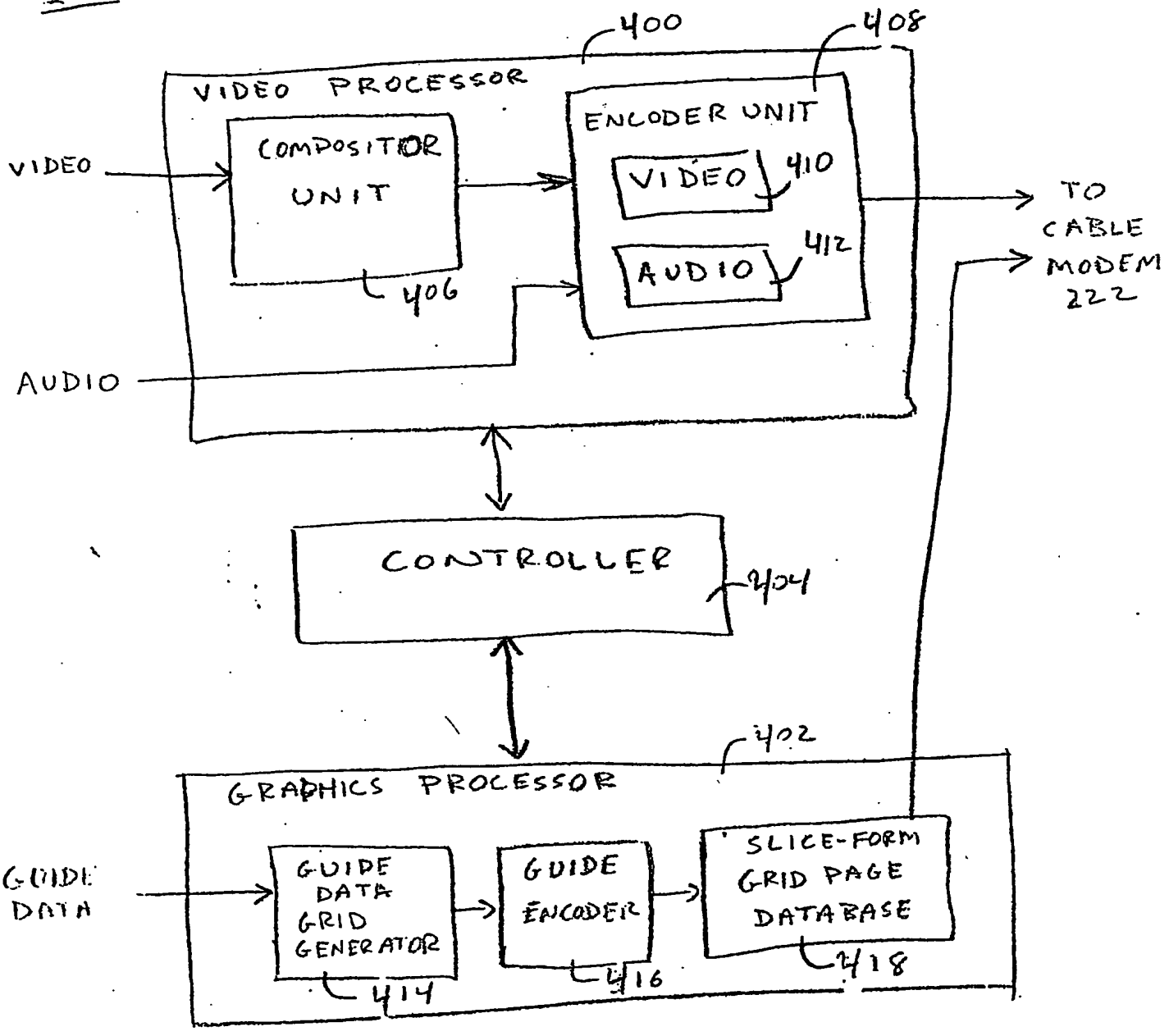

400
408
VIDEO PROCESSOR
ENCODER UNIT
COMPOSITOR UNIT
VIDEO
410
AUDIO
412
406
TO CABLE MODEM 222
AUDIO
CONTROLLER
404
402
GRAPHICS PROCESSOR
GUIDE DATA
GUIDE DATA GRID GENERATOR
GUIDE ENCODER
SLICE-FORM GRID PAGE DATABASE
414
416
418

FIGURE 4

DOCSIS 1.0 SPECIFICATION

226

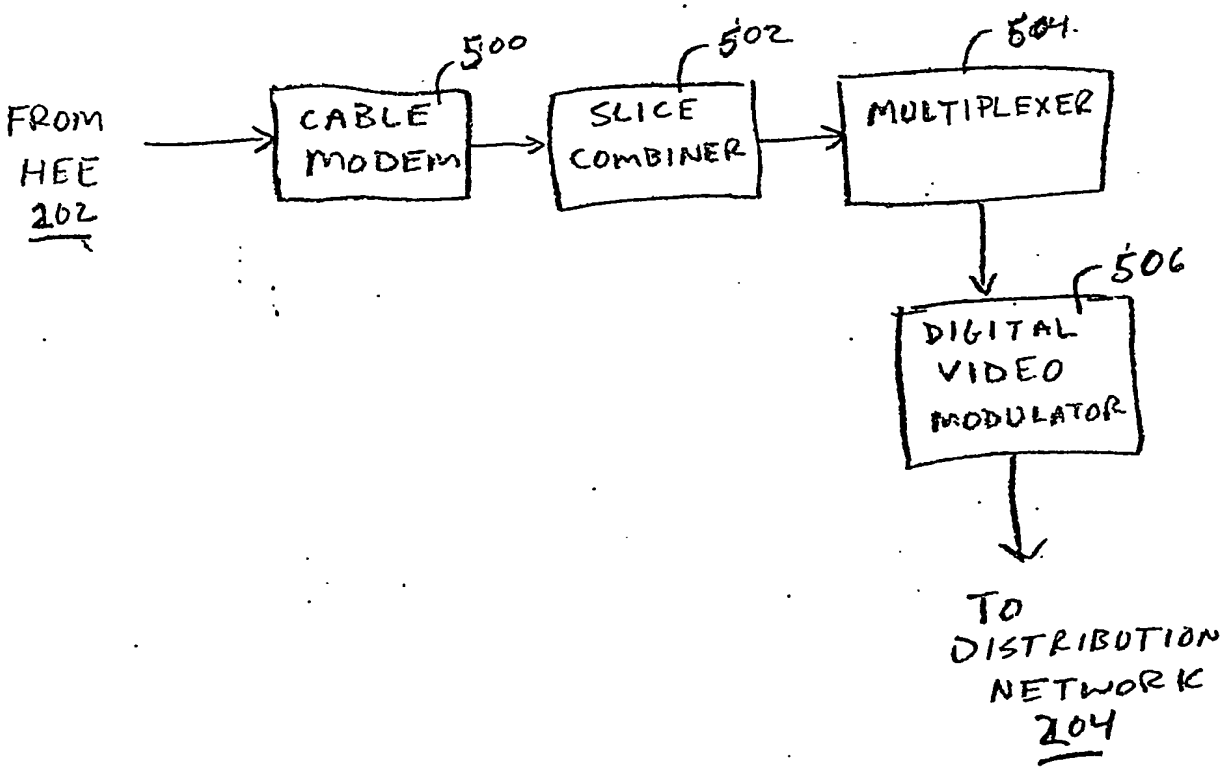


FIGURE 5

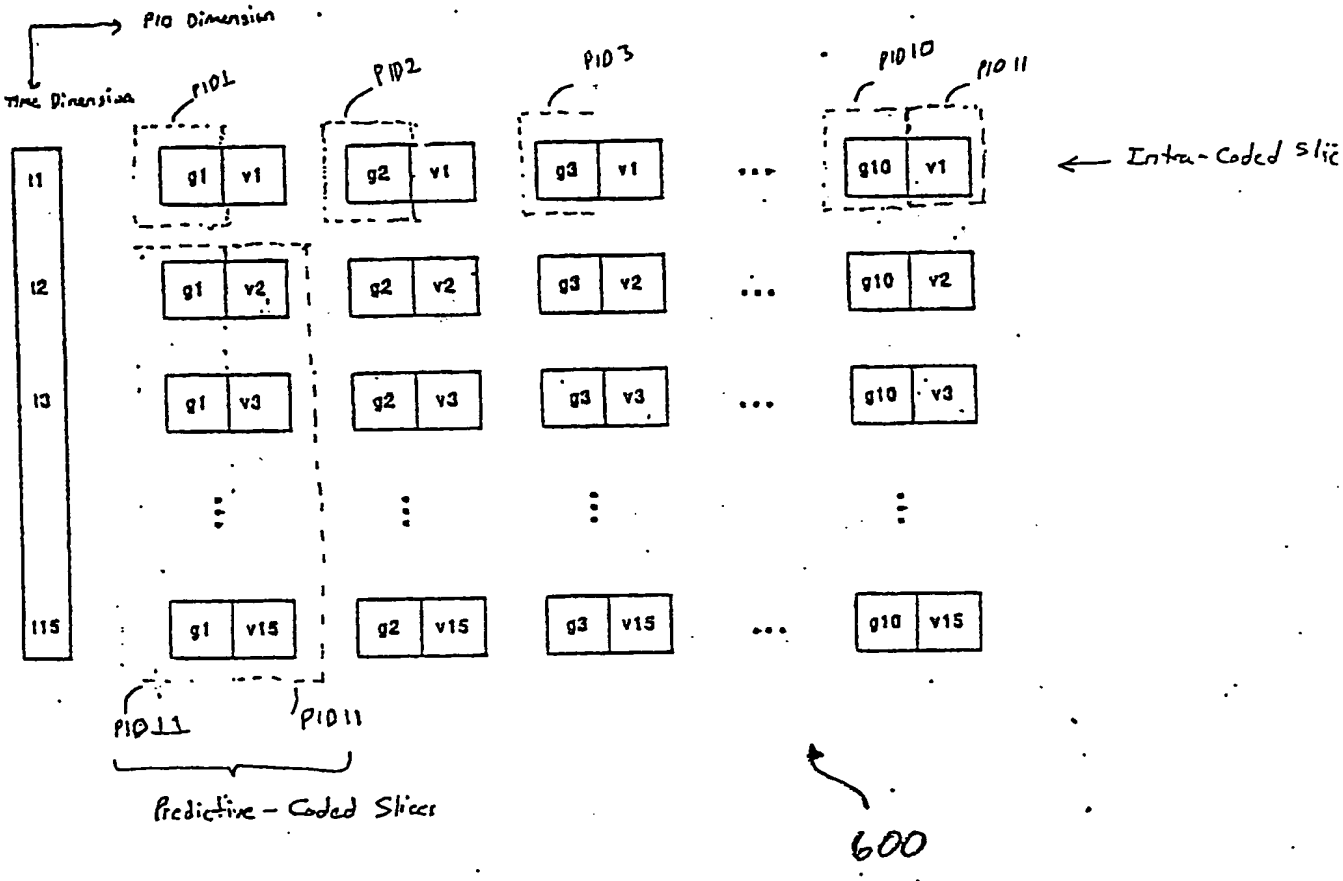

PID Dimension
Time Dimension
PID1
PID2
PID3
PID10
PID11
t1
t2
t3
t15
g1 v1
g2 v1
g3 v1
g10 v1
g1 v2
g2 v2
g3 v2
g10 v2
g1 v3
g2 v3
g3 v3
g10 v3
g1 v15
g2 v15
g3 v15
g10 v15
← Intra-Coded Slic
PID11
PID11
Predictive-Coded Slices
600

Figure 6

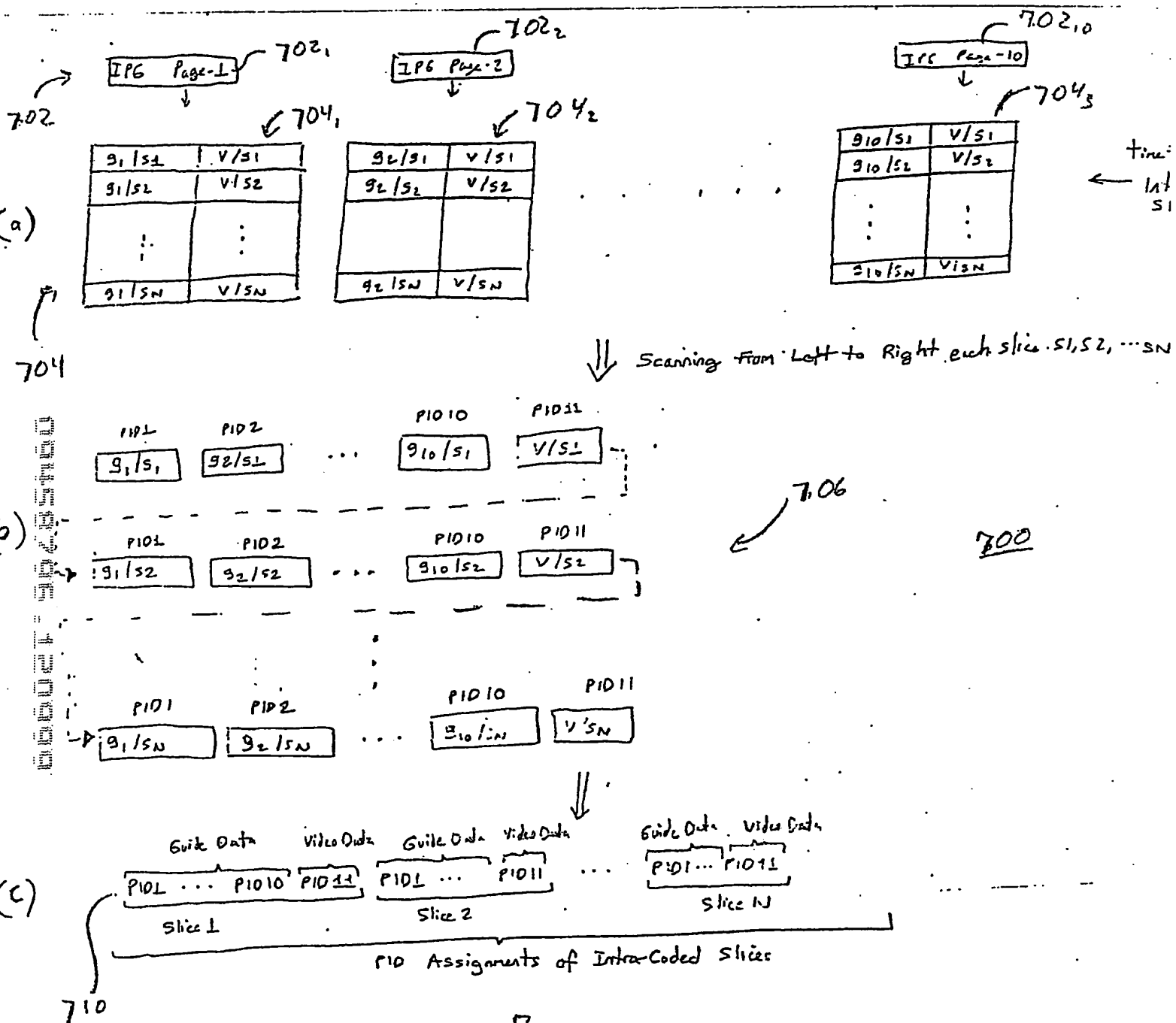

702
IPG Page-1
702₁
IPG Page-2
702₂
IPG Page-10
702₁₀
704₁
704₂
704₃
(a)
time
704
Scanning From Left to Right each slice S1, S2, ... SN
(b)
PID1
PID2
PID10
PID11
706
700
(c)
Guide Data
Video Data
Slice 1
Slice 2
Slice N
PID Assignments of Intra-Coded Slices
710

Figure 7

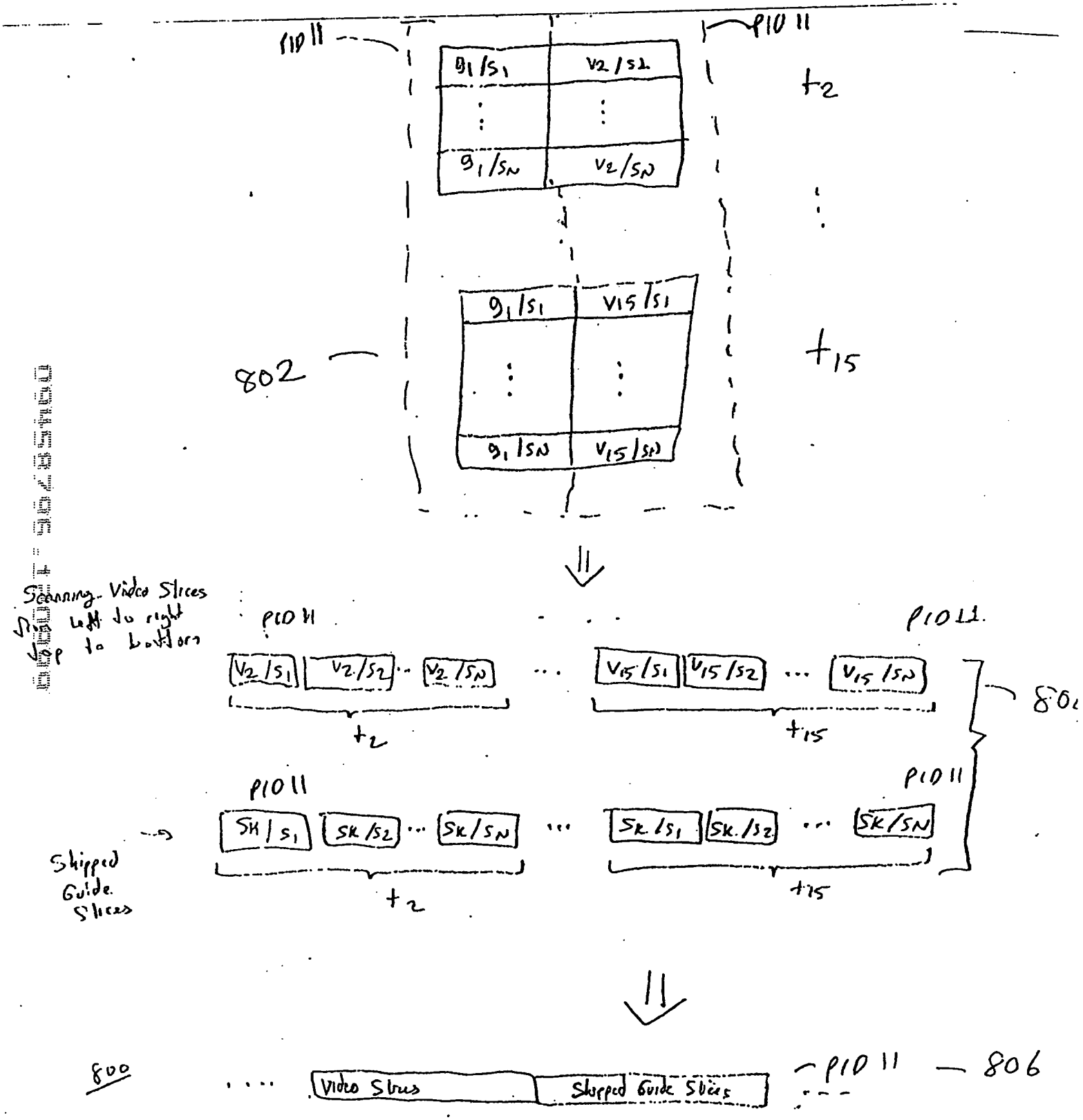

PID 11
PID 11
g_1/s_1
v_2/s_2
g_1/s_N
v_2/s_N
t_2
g_1/s_1
v_{15}/s_1
g_1/s_N
v_{15}/s_N
t_{15}
802
Scanning Video Slices left to right top to bottom
PID 11
PID 11
v_2/s_1
v_2/s_2
v_2/s_N
v_{15}/s_1
v_{15}/s_2
v_{15}/s_N
t_2
t_{15}
804
PID 11
PID 11
sk/s_1
sk/s_2
sk/s_N
sk/s_1
sk/s_2
sk/s_N
Skipped Guide Slices
t_2
t_{15}
800
Video Slices
Skipped Guide Slices
PID 11
806

Figure 8

DOCUMENT 30235760

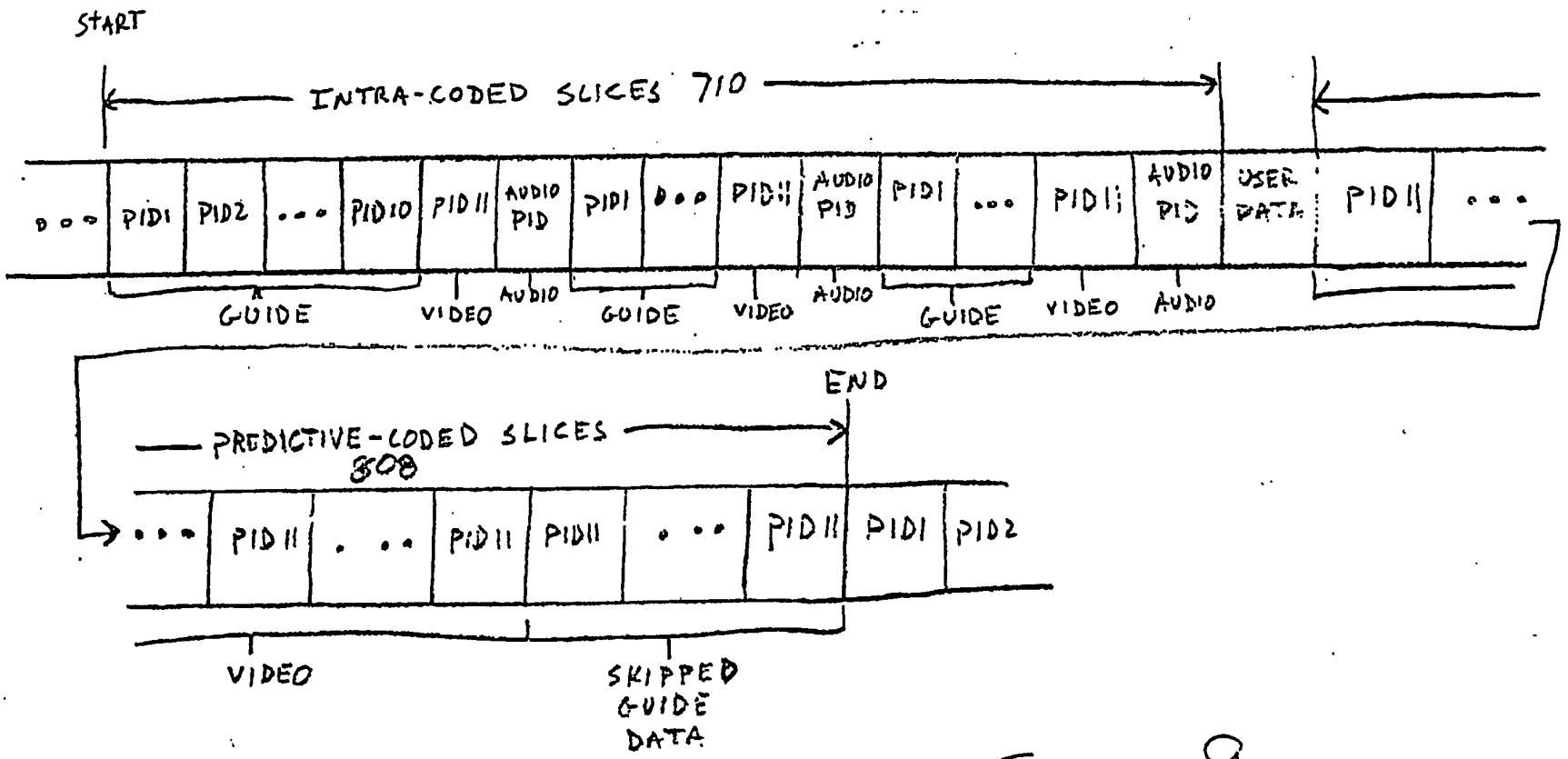


Figure 9

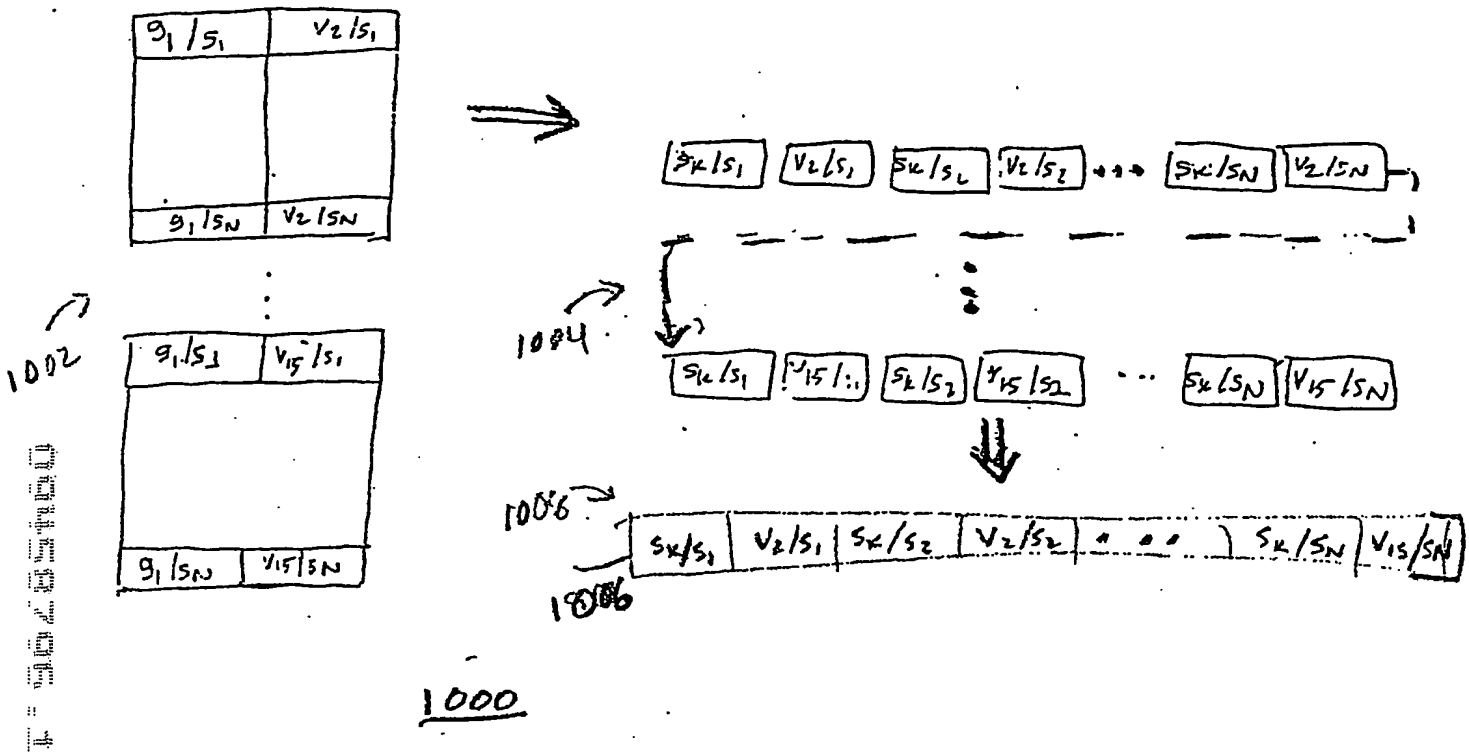


Figure 10

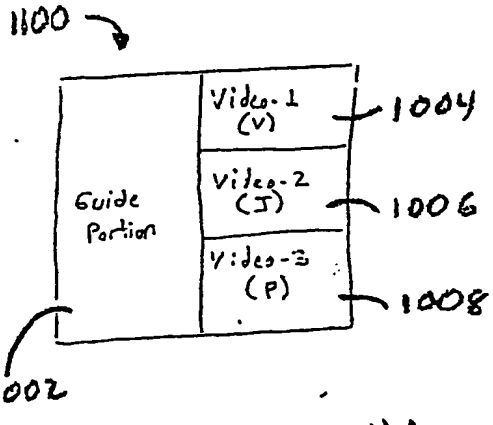


FIGURE 11A

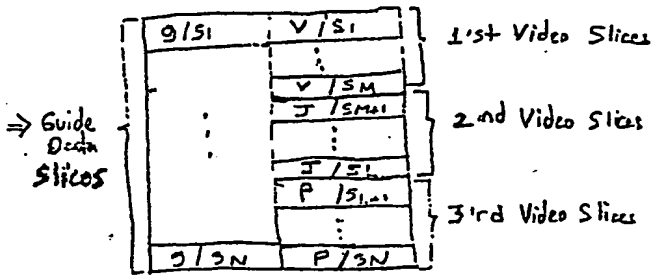


Figure 11B

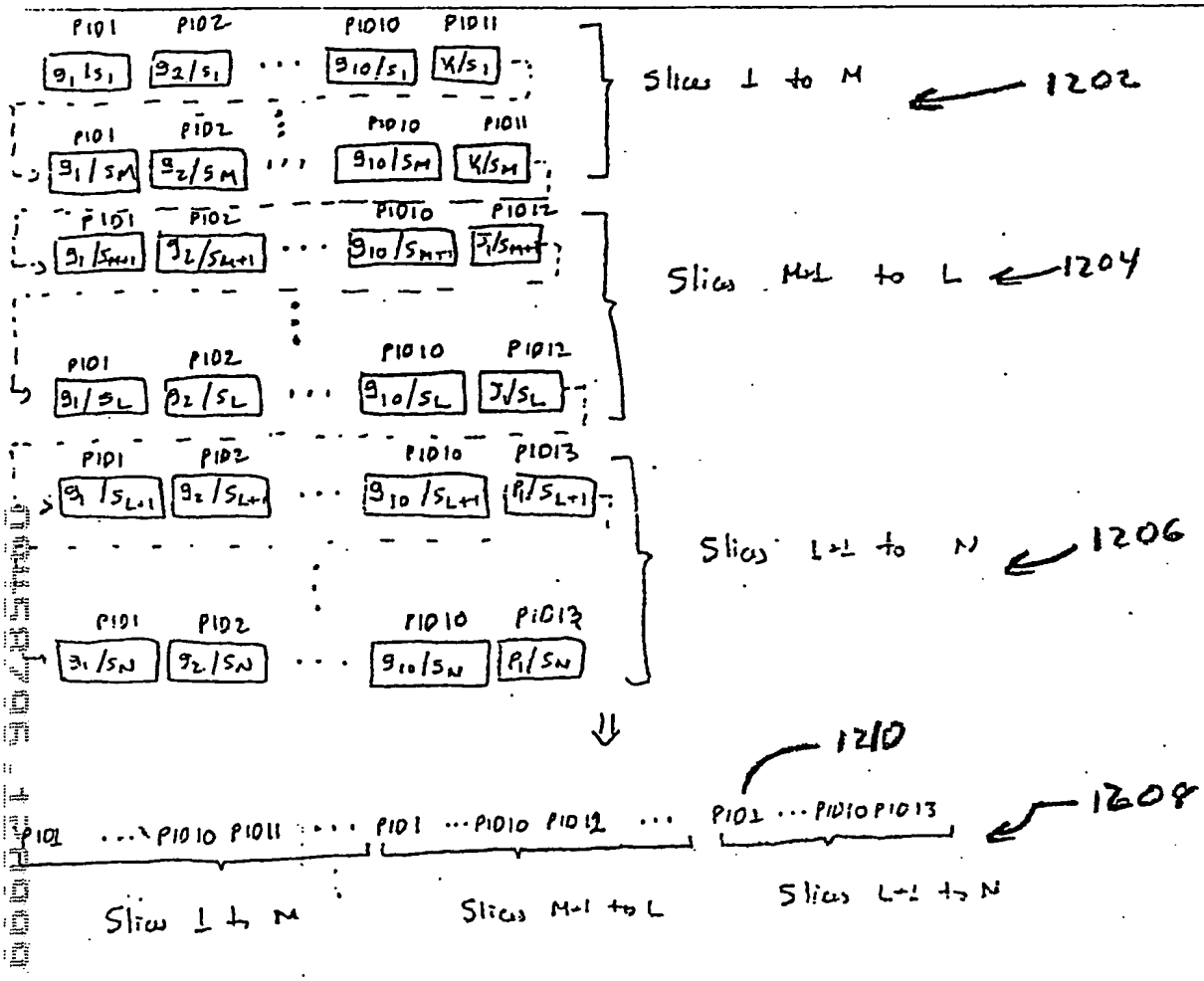
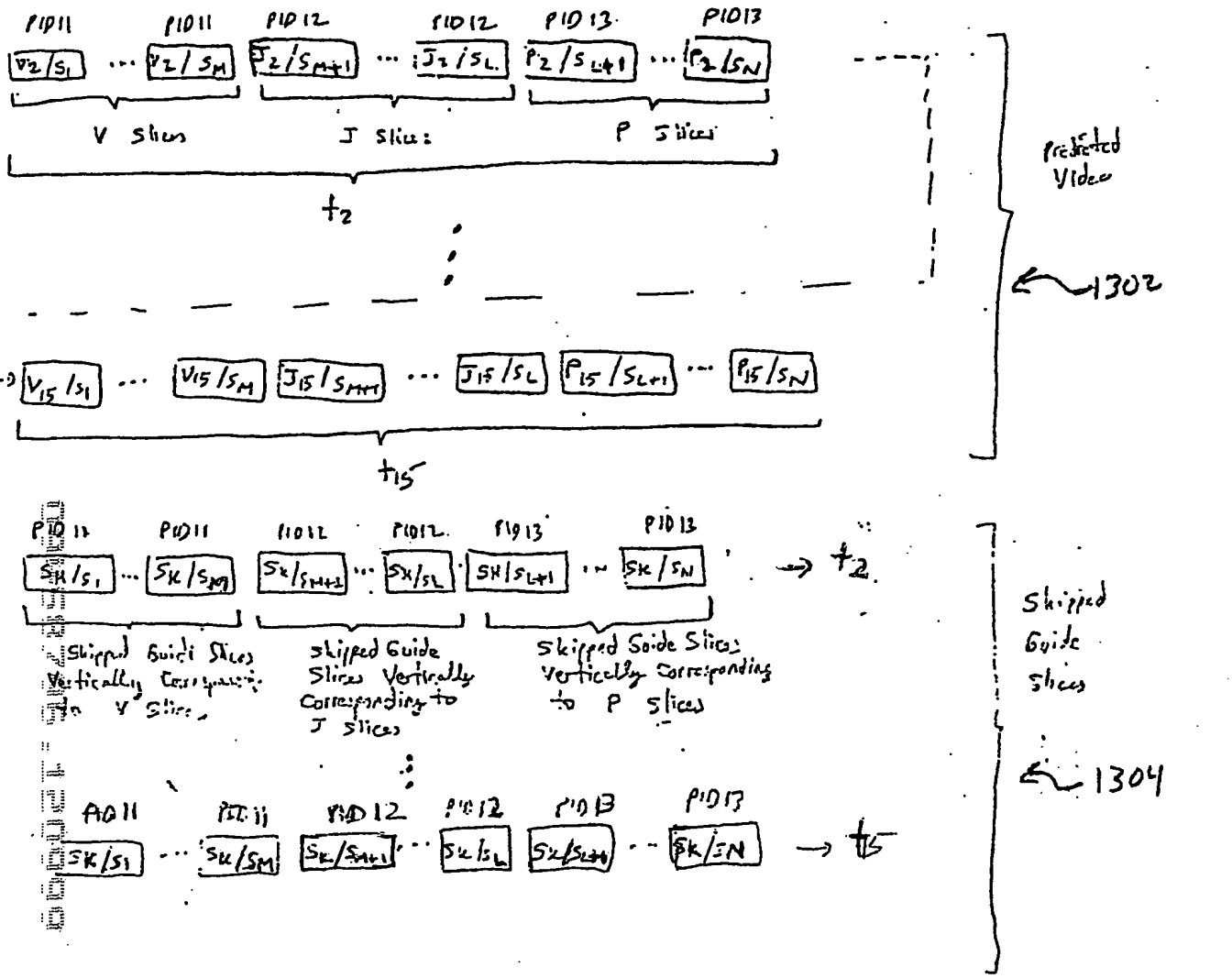

PID1
PID2
PID10
PID11
PID12
PID13
Slices 1 to M
1202
Slices M+1 to L
1204
1200
Slices L+1 to N
1206
1210
1208
Slice 1 to M
Slices M+1 to L
Slices L+1 to N

Figure 12


PID11
PID11
PID12
PID12
PID13
PID13
V Slices
J Slices
P Slices
t_2
t_{15}
Predicted Video
1300
1302
PID 11
PID11
PID12
PID12
PID13
PID13
Skipped Guide Slices Vertically Corresponding to V Slices
Skipped Guide Slices Vertically Corresponding to J Slices
Skipped Guide Slices Vertically Corresponding to P Slices
t_2
Skipped Guide Slices
1304
PID11
PID11
PID12
PID12
PID13
PID13
t_{15}

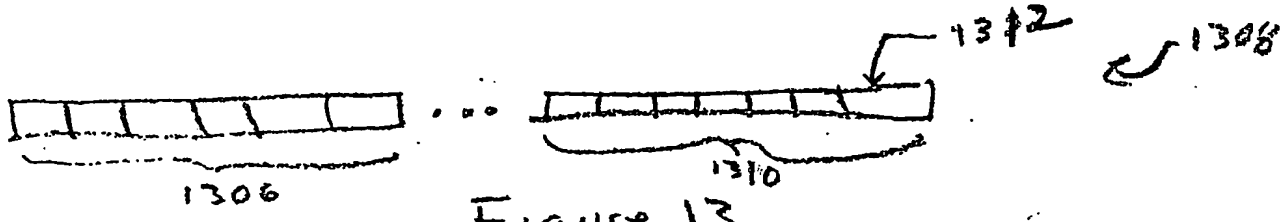

1312
1306
1306
1310

Figure 13

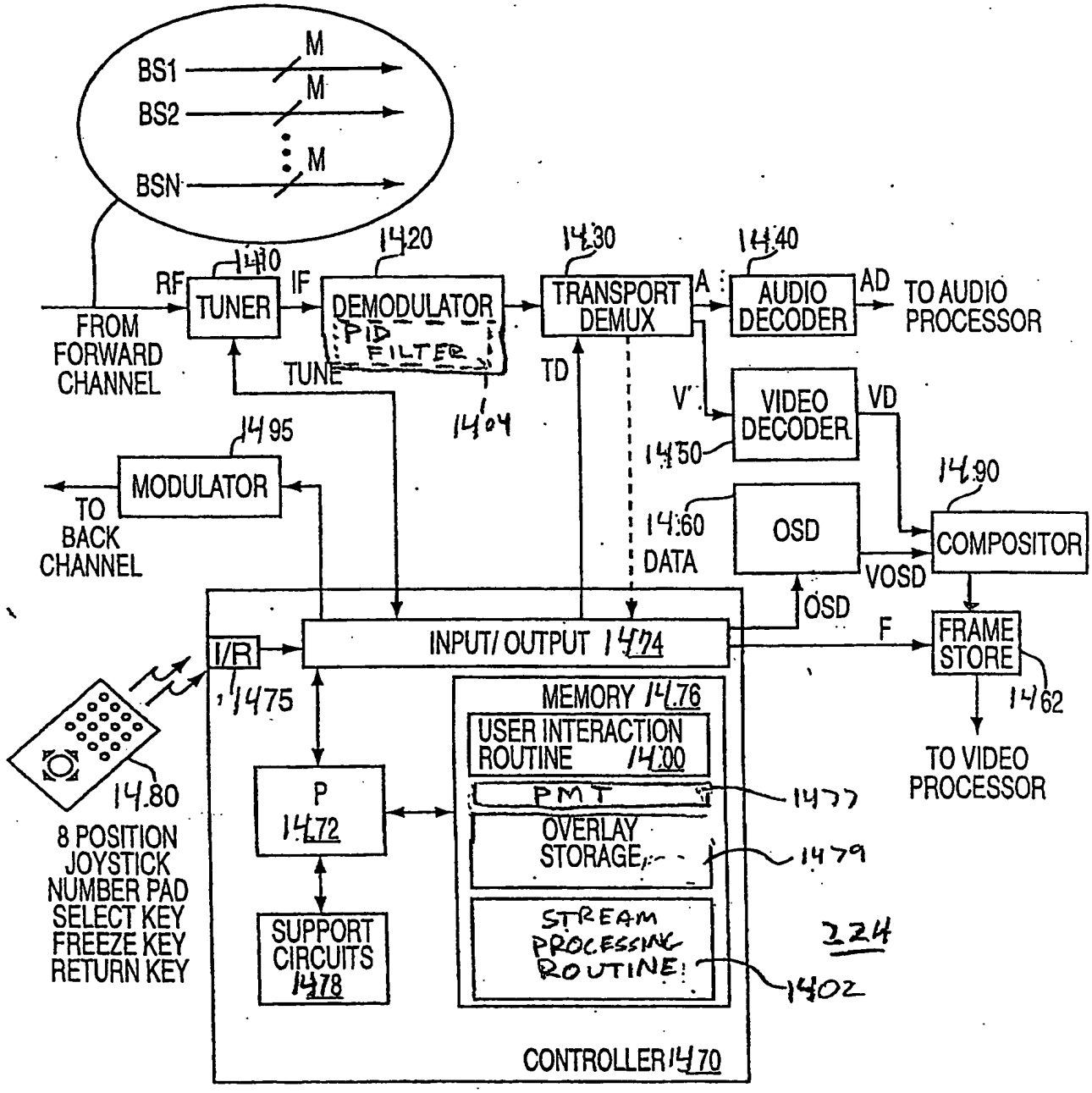

BS1
BS2
BSN
M
M
M
RF
IF
TUNER
1410
DEMODULATOR
PID FILTER
1420
TRANSPORT DEMUX
1430
AUDIO DECODER
1440
A
AD
TO AUDIO PROCESSOR
FROM FORWARD CHANNEL
TUNE
1404
TD
V
VIDEO DECODER
VD
1450
MODULATOR
1495
TO BACK CHANNEL
1460
OSD
DATA
COMPOSITOR
1490
VOSD
OSD
F
FRAME STORE
1462
TO VIDEO PROCESSOR
I/R
1475
INPUT/ OUTPUT 1474
MEMORY 1476
USER INTERACTION ROUTINE 1400
PMT
1477
OVERLAY STORAGE
1479
STREAM PROCESSING ROUTINE
1402
224
P
1472
SUPPORT CIRCUITS 1478
1480
8 POSITION JOYSTICK
NUMBER PAD
SELECT KEY
FREEZE KEY
RETURN KEY
CONTROLLER 1470

Figure 14

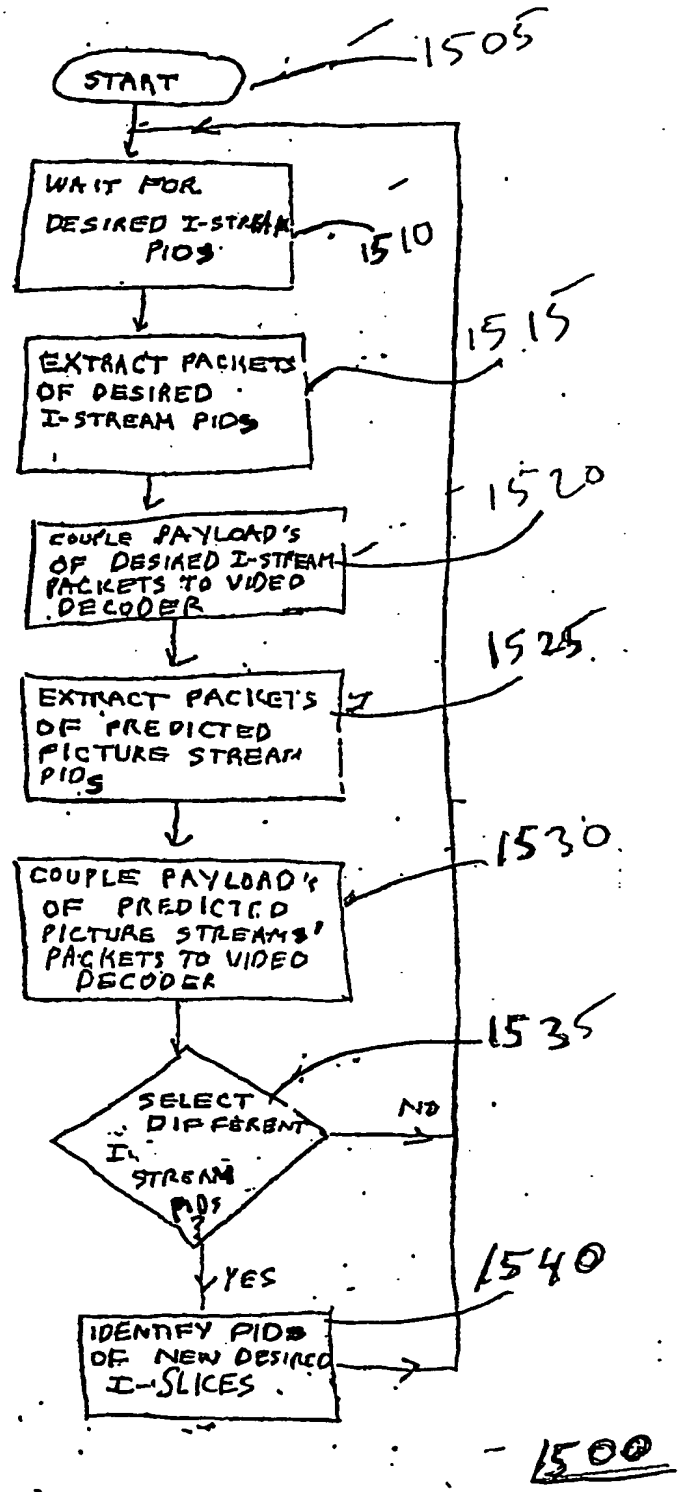

START
1505
WAIT FOR DESIRED I-STREAM PIDs
1510
EXTRACT PACKETS OF DESIRED I-STREAM PIDs
1515
COUPLE PAYLOAD'S OF DESIRED I-STREAM PACKETS TO VIDEO DECODER
1520
EXTRACT PACKETS OF PREDICTED PICTURE STREAM PIDs
1525
COUPLE PAYLOAD'S OF PREDICTED PICTURE STREAMS' PACKETS TO VIDEO DECODER
1530
SELECT DIFFERENT I-STREAM PIDs
1535
NO
YES
IDENTIFY PIDs OF NEW DESIRED I-SLICES
1540
1500

Figure 15

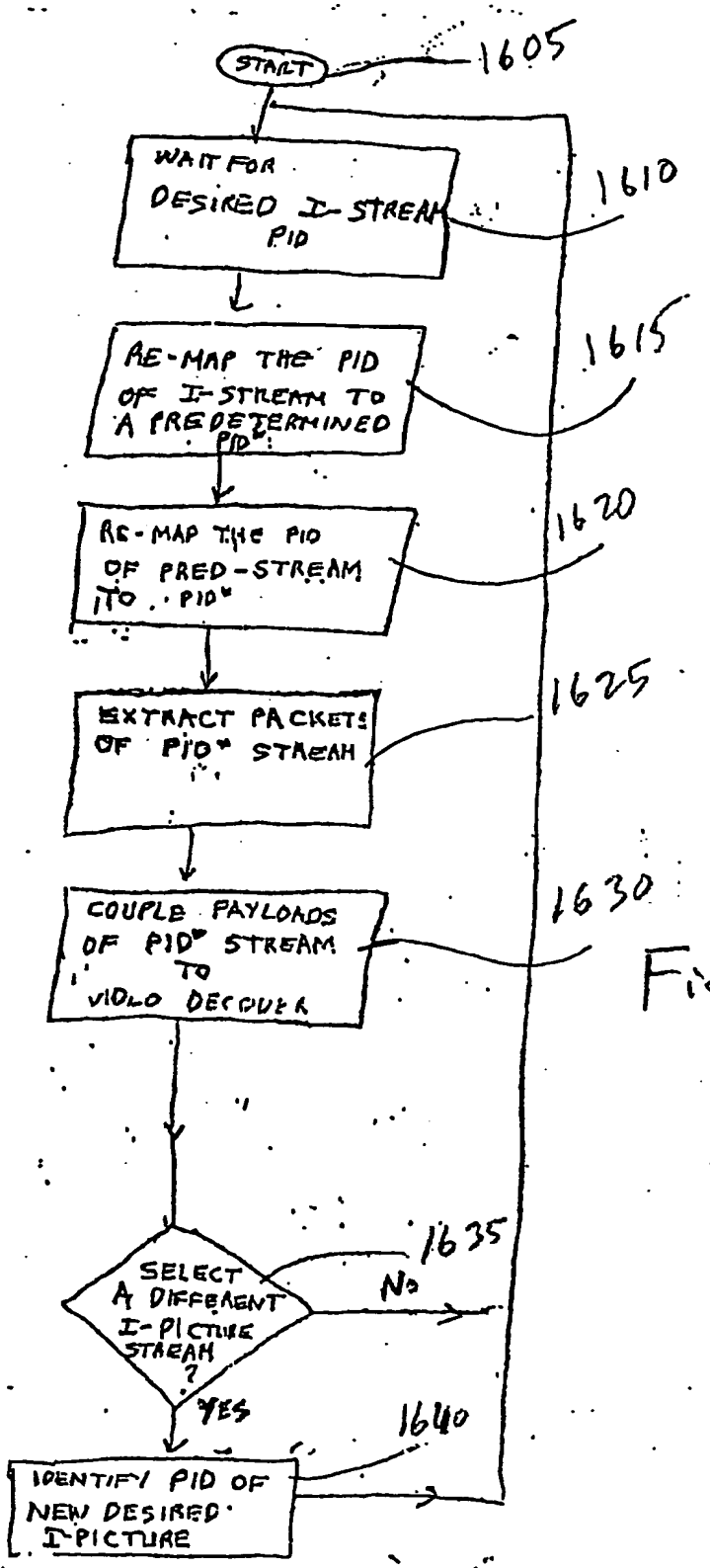

START
1605
WAIT FOR DESIRED I-STREAM PID
1610
RE-MAP THE PID OF I-STREAM TO A PREDETERMINED PID
1615
1600
RE-MAP THE PID OF PRED-STREAM TO "PID"
1620
EXTRACT PACKETS OF "PID" STREAM
1625
COUPLE PAYLOADS OF "PID" STREAM TO VIDEO DECODER
1630
SELECT A DIFFERENT I-PICTURE STREAM ?
1635
No
YES
1640
IDENTIFY PID OF NEW DESIRED I-PICTURE

Figure 16

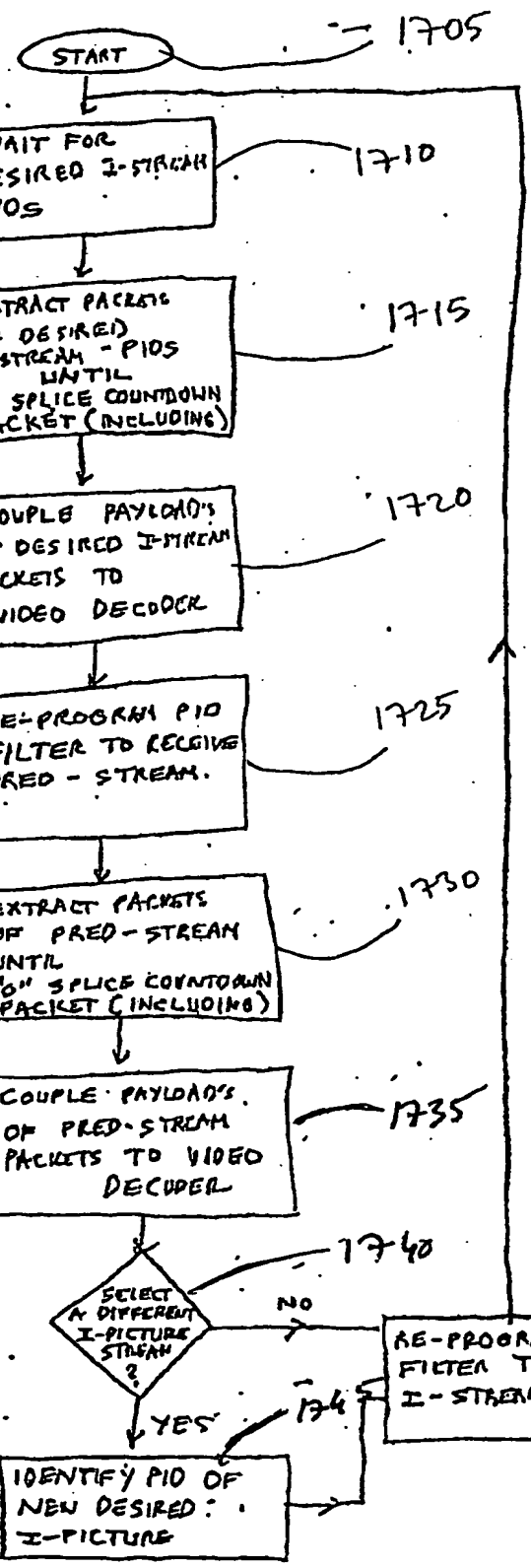


Figure 17

1700

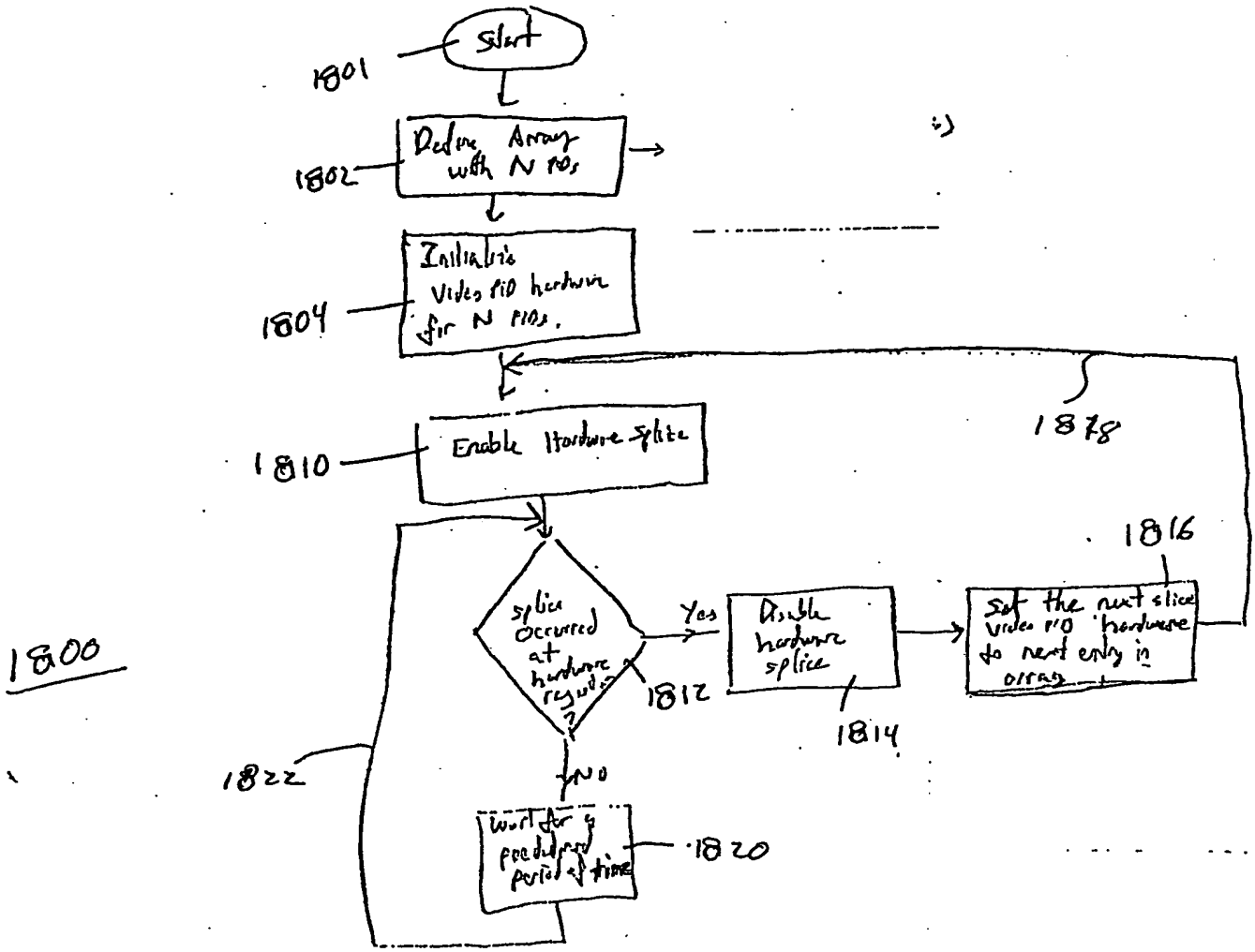

Start
1801
Declare Array with N PIDs
1802
Initialize Video PID hardware for N PIDs.
1804
Enable Hardware Splice
1810
1878
1816
splice occurred at hardware register?
Yes
1812
Disable hardware splice
1814
Set the next slice Video PID hardware to next entry in array
1800
1822
NO
Wait for a predetermined period of time
1820

Figure 18

time = t_1

PID 1	PID 2	PID 3	...	PID 9	PID 10	PID 11	PID 12	PID 13
g1/s1	g2/s1	g3/s1	...	g9/s1	g10/s1	V1/s1	M1/s1	K1/s1
g1/s2	g2/s2	g3/s2	...	g9/s2	g10/s2	V1/s2	M1/s2	K1/s2
g1/s3	g2/s3	g3/s3	...	g9/s3	g10/s3	V1/s3	M1/s3	K1/s3
⋮	⋮	⋮		⋮	⋮	⋮	⋮	⋮
g1/sN	g2/sN	g3/sN	...	g9/sN	g10/sN	V1/sN	M1/sN	K1/sN

1900

Intra-coded Guide and Video

Fig. 19

time	PID 11	PID 12	PID 13	PID 11	PID 12	PID 13	...	PID 11	PID 12	PID 13	
t_2	V2/S1	M2/S1	K2/S1	V2/S2	M2/S2	K2/S2	...	V2/SN	M2/SN	K2/SN	2002
t_3	V3/S1	M3/S1	K3/S1	V3/S2	M3/S2	K3/S2	...	V3/SN	M3/SN	K3/SN	2003
t_4	V4/S1	M4/S1	K4/S1	V4/S2	M4/S2	K4/S2	...	V4/SN	M4/SN	K4/SN	2004
⋮	⋮	⋮	⋮	⋮	⋮	⋮		⋮	⋮	⋮	
t_{15}	V15/S1	M15/S1	K15/S1	V15/S2	M15/S2	K15/S2	...	V15/SN	M15/SN	K15/SN	2015

Predicted Video 2000

Fig. 20

time	PID 11	PID 12	PID 13	PID 11	PID 12	PID 13		PID 11	PID 12	PID 13	
t_2	SK/S1	SK/S1	SK/S1	SK/S2	SK/S2	SK/S2	...	SK/SN	SK/SN	SK/SN	2102
t_3	SK/S1	SK/S1	SK/S1	SK/S2	SK/S2	SK/S2	...	SK/SN	SK/SN	SK/SN	2103
t_4	SK/S1	SK/S1	SK/S1	SK/S2	SK/S2	SK/S2	...	SK/SN	SK/SN	SK/SN	2104
⋮	⋮	⋮	⋮	⋮	⋮	⋮		⋮	⋮	⋮	...
t_{15}	SK/S1	SK/S1	SK/S1	SK/S2	SK/S2	SK/S2	...	SK/SN	SK/SN	SK/SN	210N

Skipped Guide 2100

Fig. 21

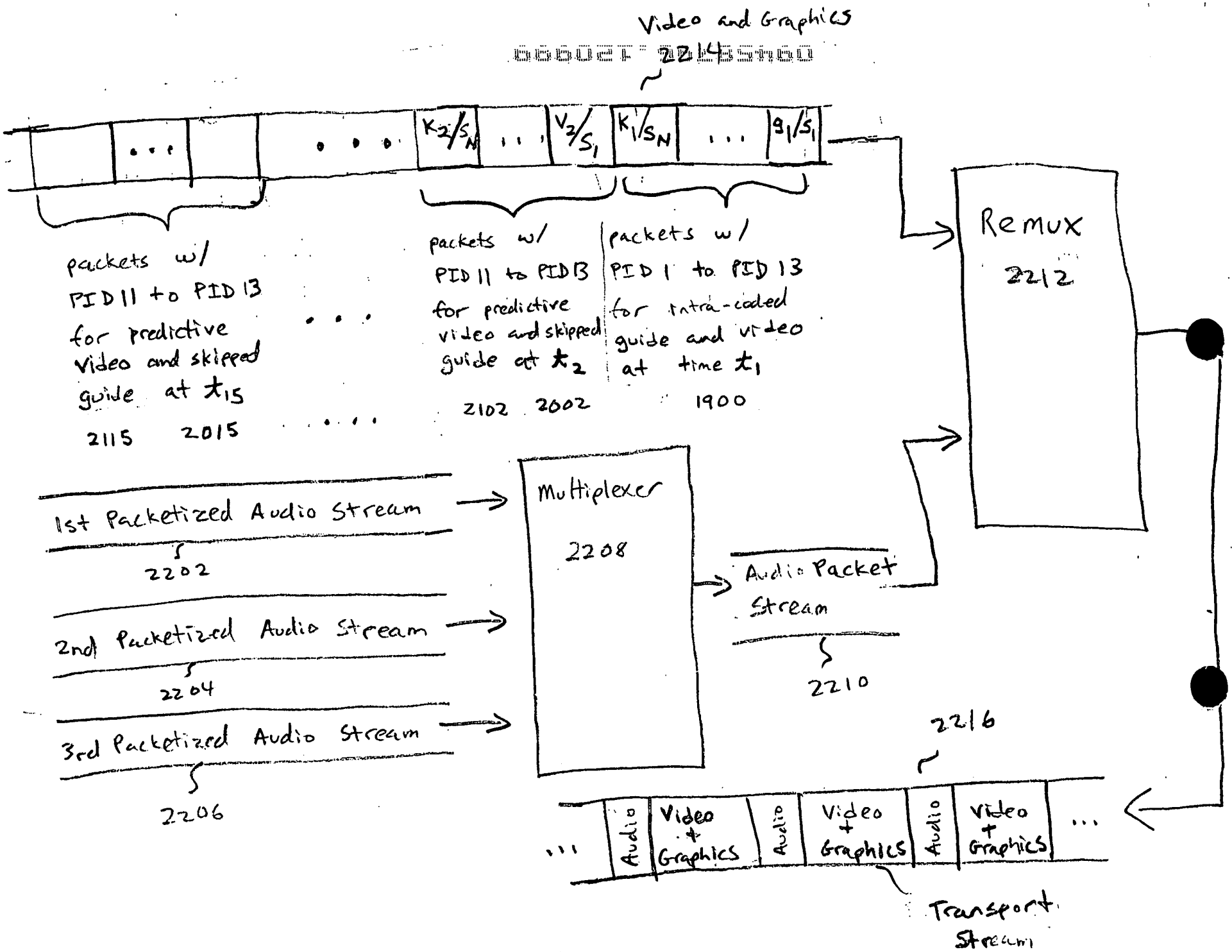
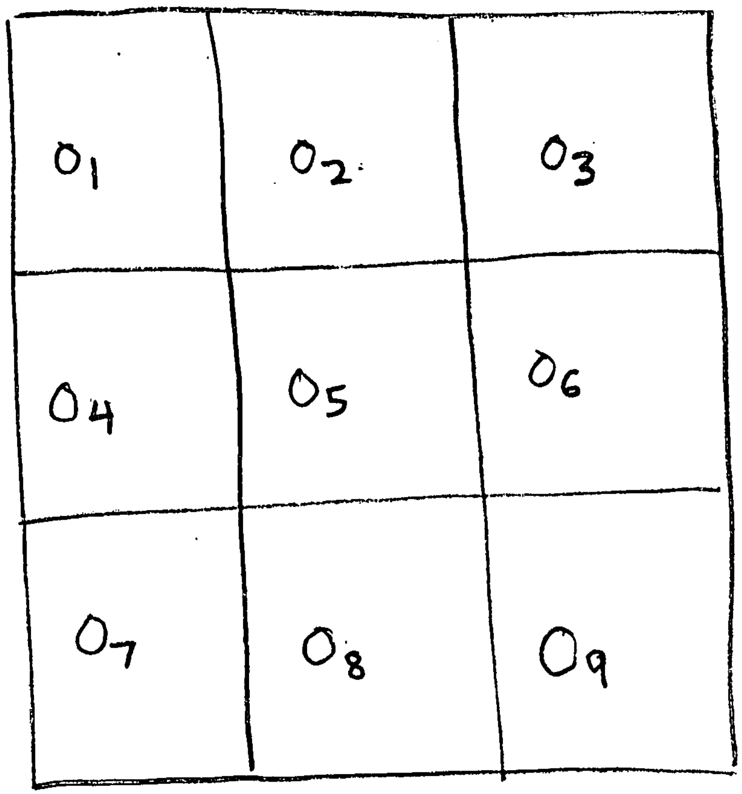
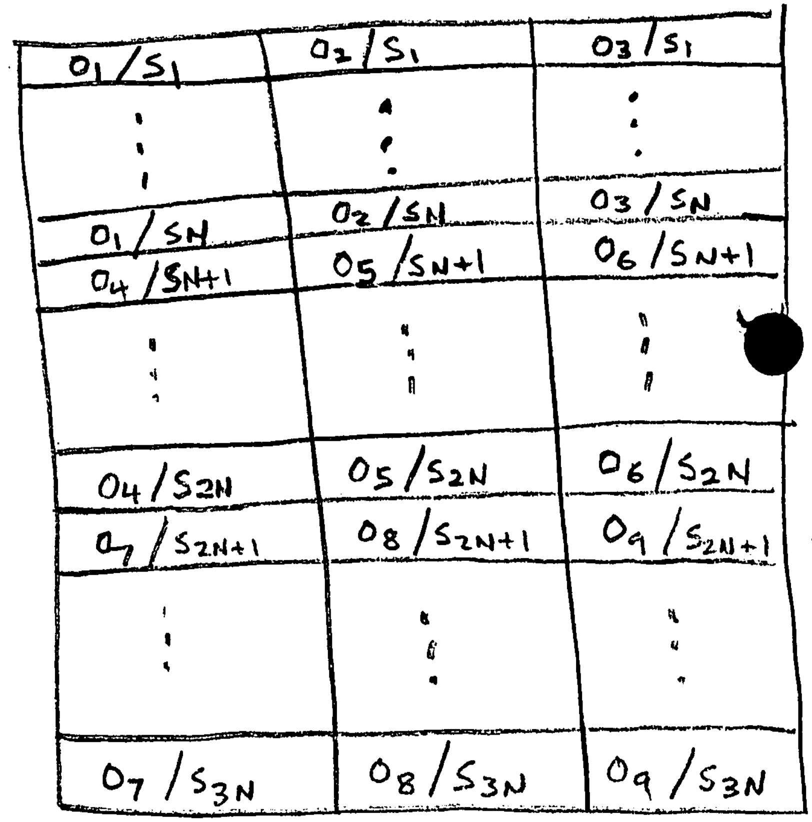

Video and Graphics
packets w/ PID 11 to PID 13 for predictive video and skipped guide at t_{15}
2115
2015
packets w/ PID 11 to PID 13 for predictive video and skipped guide at t_2
2102
2002
packets w/ PID 1 to PID 13 for intra-coded guide and video at time t_1
1900
Remux
2212
1st Packetized Audio Stream
2202
2nd Packetized Audio Stream
2204
3rd Packetized Audio Stream
2206
Multiplexer
2208
Audio Packet Stream
2210
2216
Audio
Video + Graphics
Audio
Video + Graphics
Audio
Video + Graphics
Transport Stream

Fig. 22



objects

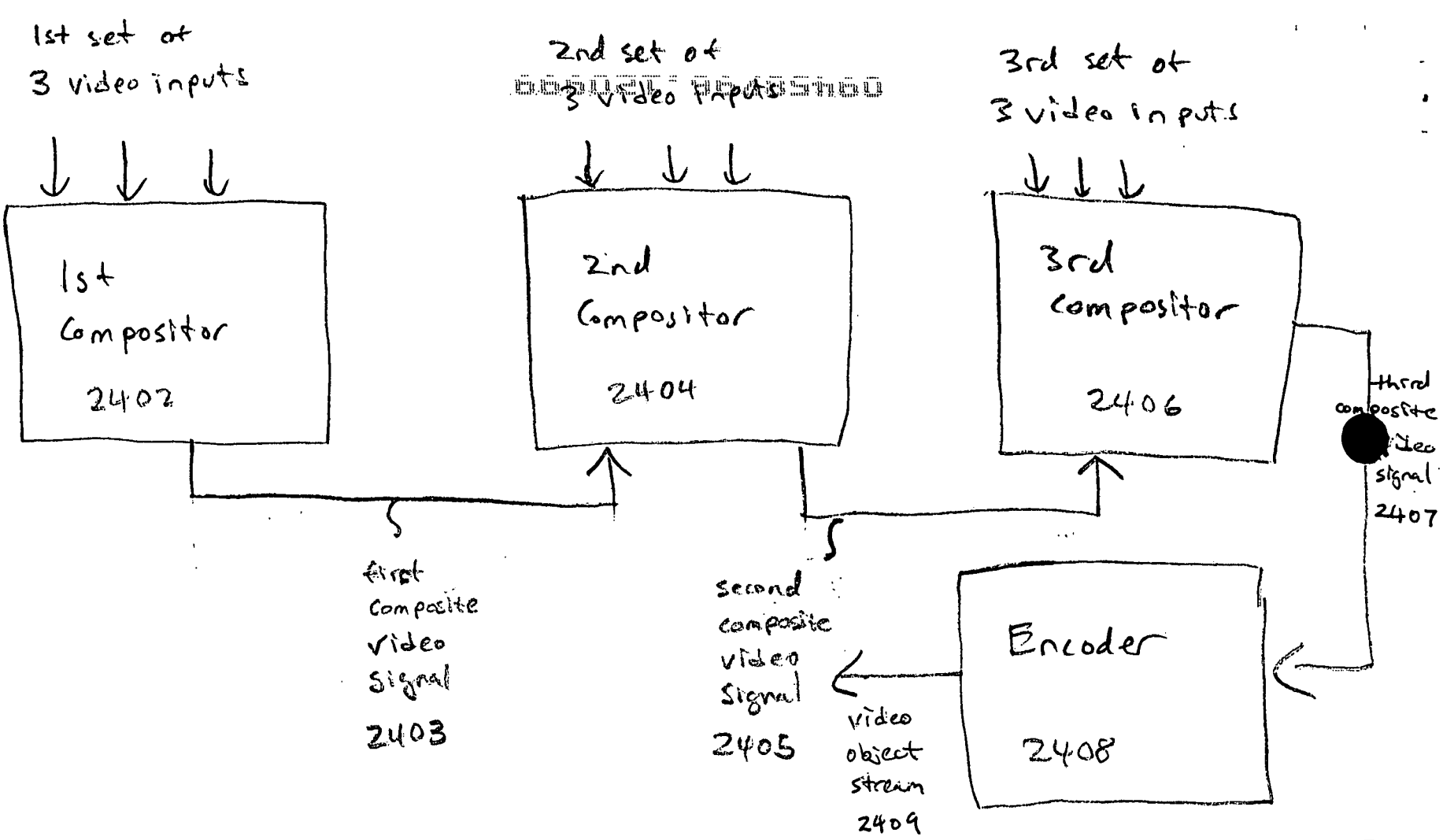
(a)



slice-based partitioning

(b)

Fig. 23



Cascade Compositor

Fig. 24

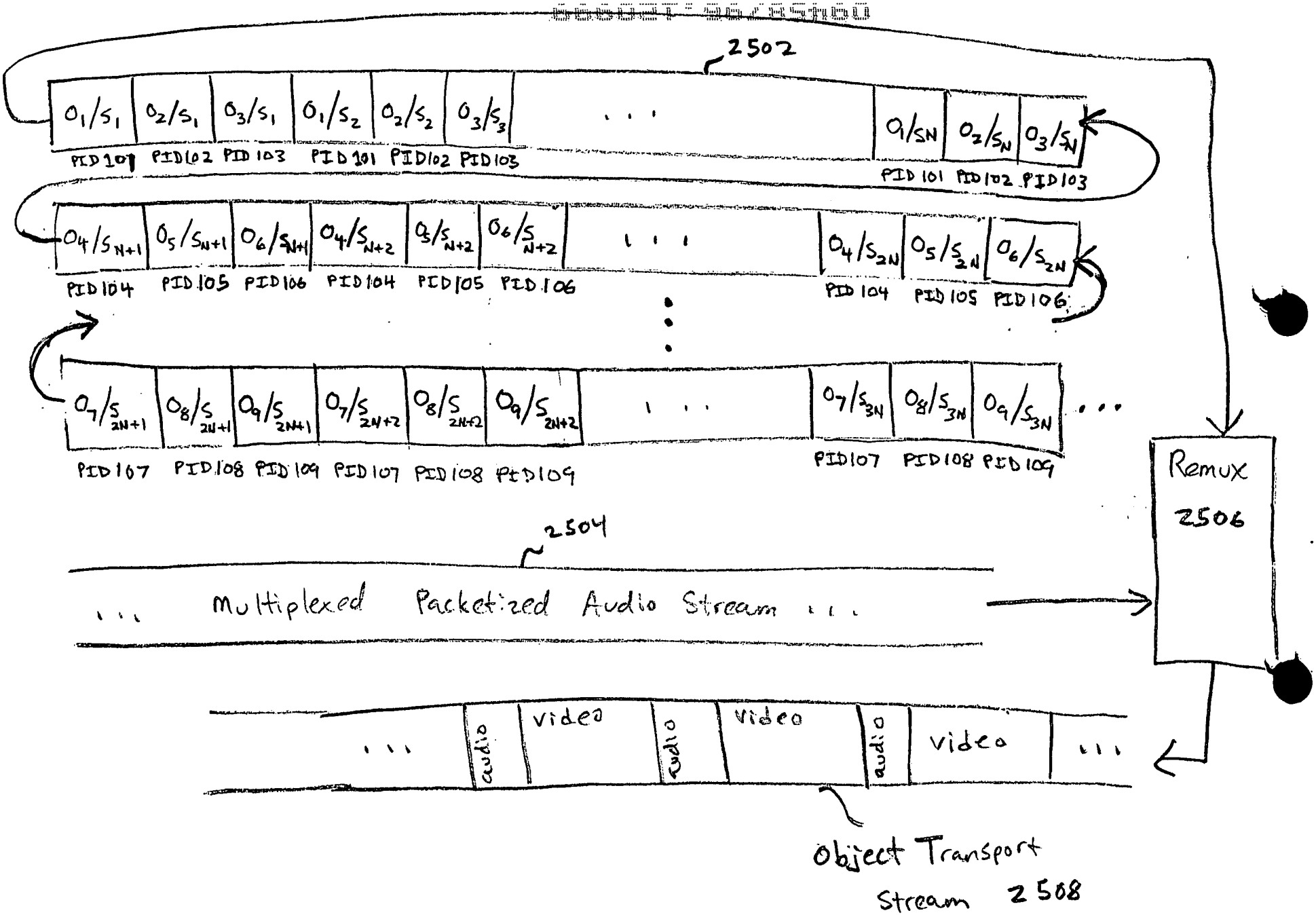

2502
O_1/S_1 O_2/S_1 O_3/S_1 O_1/S_2 O_2/S_2 O_3/S_3 . . . O_1/S_N O_2/S_N O_3/S_N
PID 101 PID 102 PID 103 PID 101 PID 102 PID 103
PID 101 PID 102 PID 103
O_4/S_{N+1} O_5/S_{N+1} O_6/S_{N+1} O_4/S_{N+2} O_5/S_{N+2} O_6/S_{N+2} . . . O_4/S_{2N} O_5/S_{2N} O_6/S_{2N}
PID 104 PID 105 PID 106 PID 104 PID 105 PID 106
PID 104 PID 105 PID 106
O_7/S_{2N+1} O_8/S_{2N+1} O_9/S_{2N+1} O_7/S_{2N+2} O_8/S_{2N+2} O_9/S_{2N+2} . . . O_7/S_{3N} O_8/S_{3N} O_9/S_{3N} . . .
PID 107 PID 108 PID 109 PID 107 PID 108 PID 109
PID 107 PID 108 PID 109
Remux
2506
2504
. . . Multiplexed Packetized Audio Stream . . .
. . .
audio
video
audio
video
audio
video
. . .
Object Transport
Stream 2508

Fig. 25

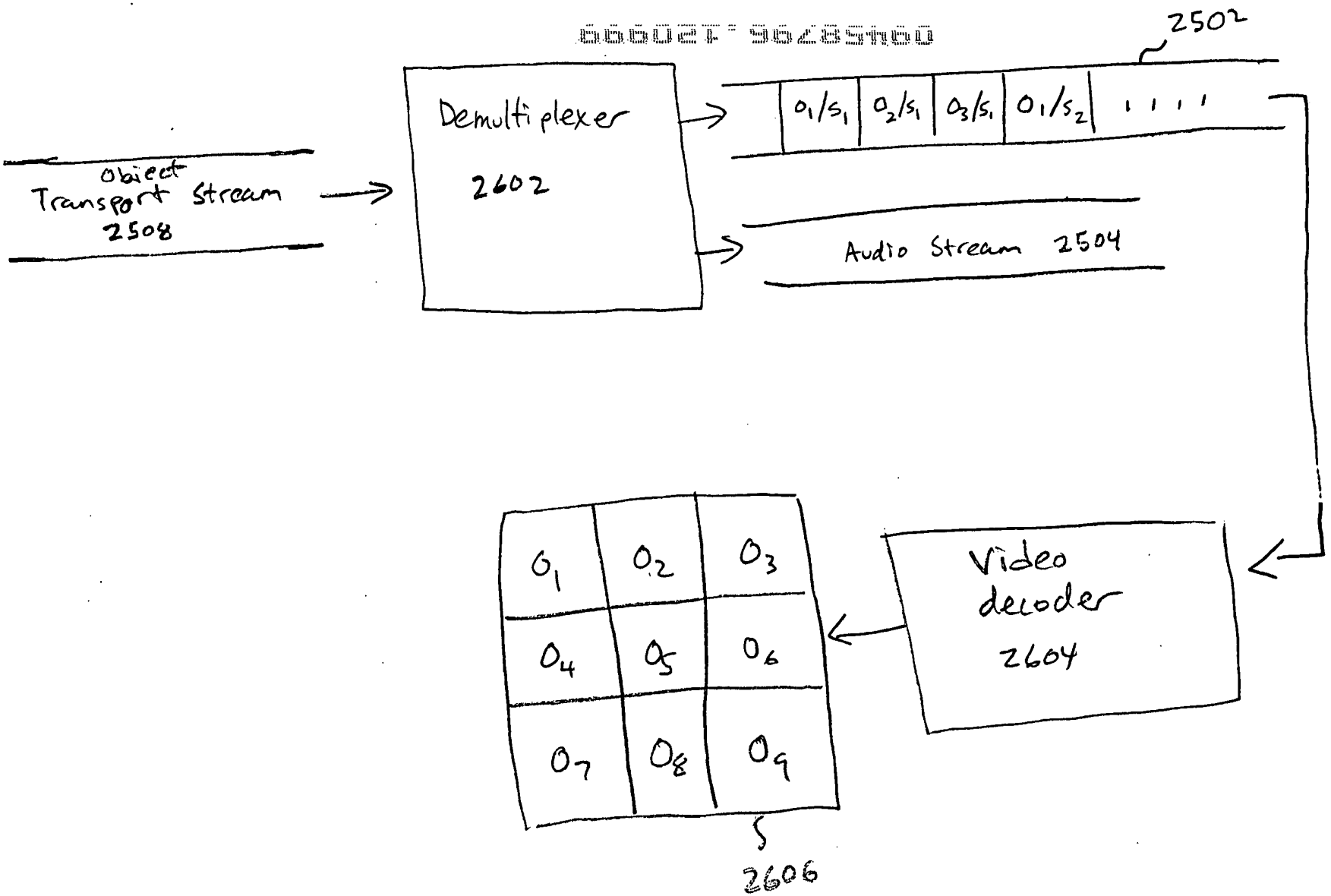

2502
Demultiplexer
2602
Object
Transport Stream
2508
O_1/S_1
O_2/S_1
O_3/S_1
O_1/S_2
Audio Stream 2504
Video
decoder
2604
O_1
O_2
O_3
O_4
O_5
O_6
O_7
O_8
O_9
2606

Fig. 26

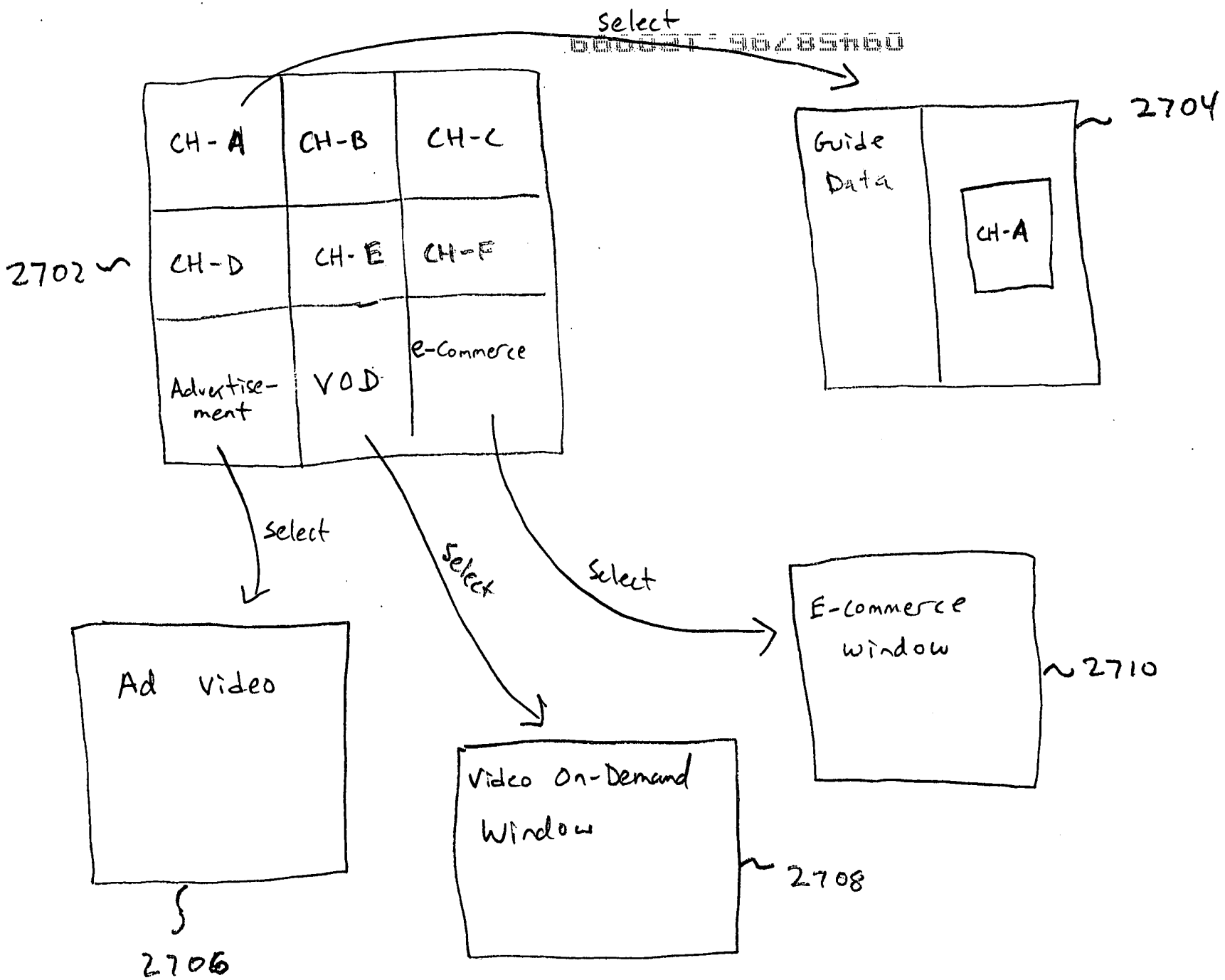

Select
CH-A
CH-B
CH-C
CH-D
CH-E
CH-F
Advertise-ment
VOD
e-Commerce
2702
Guide Data
CH-A
2704
Select
Select
Select
Ad Video
2706
Video On-Demand Window
2708
E-commerce window
2710

Fig. 27

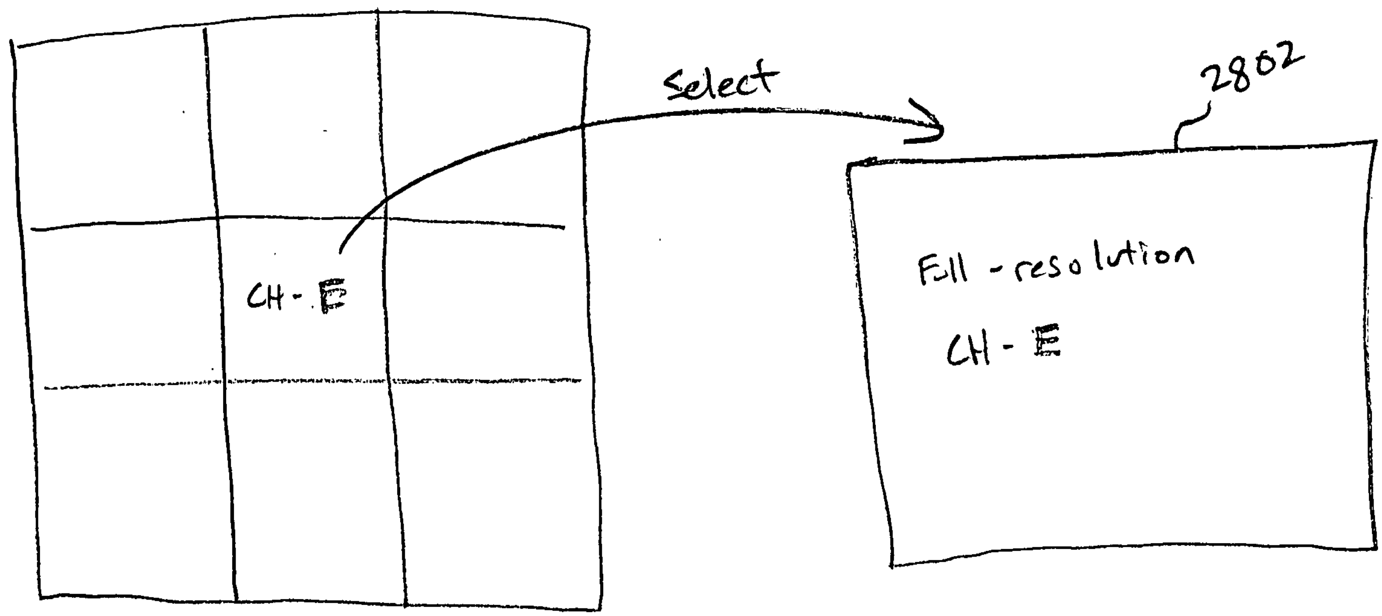


Fig. 28

6656021 - 9628480

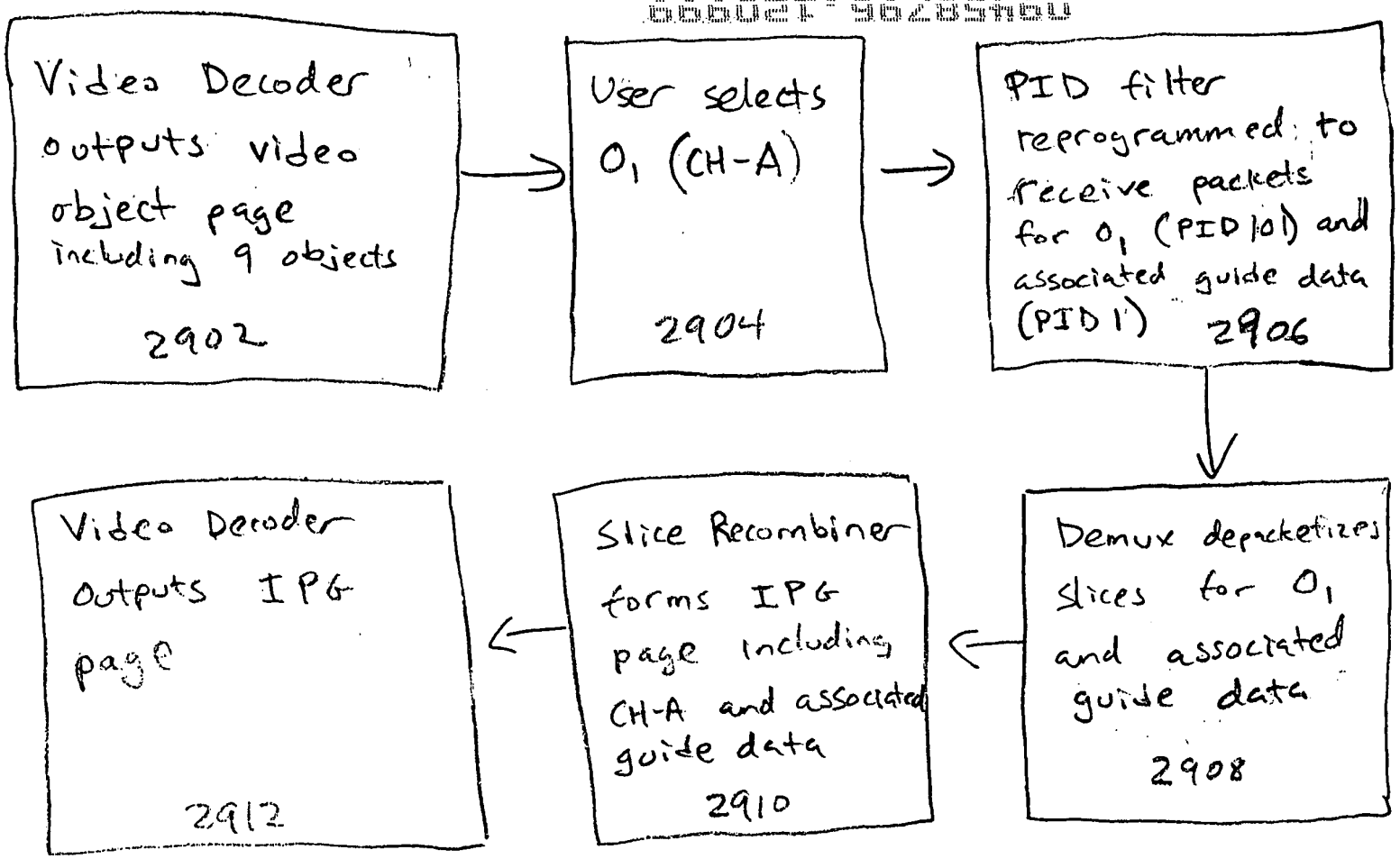


Fig. 29

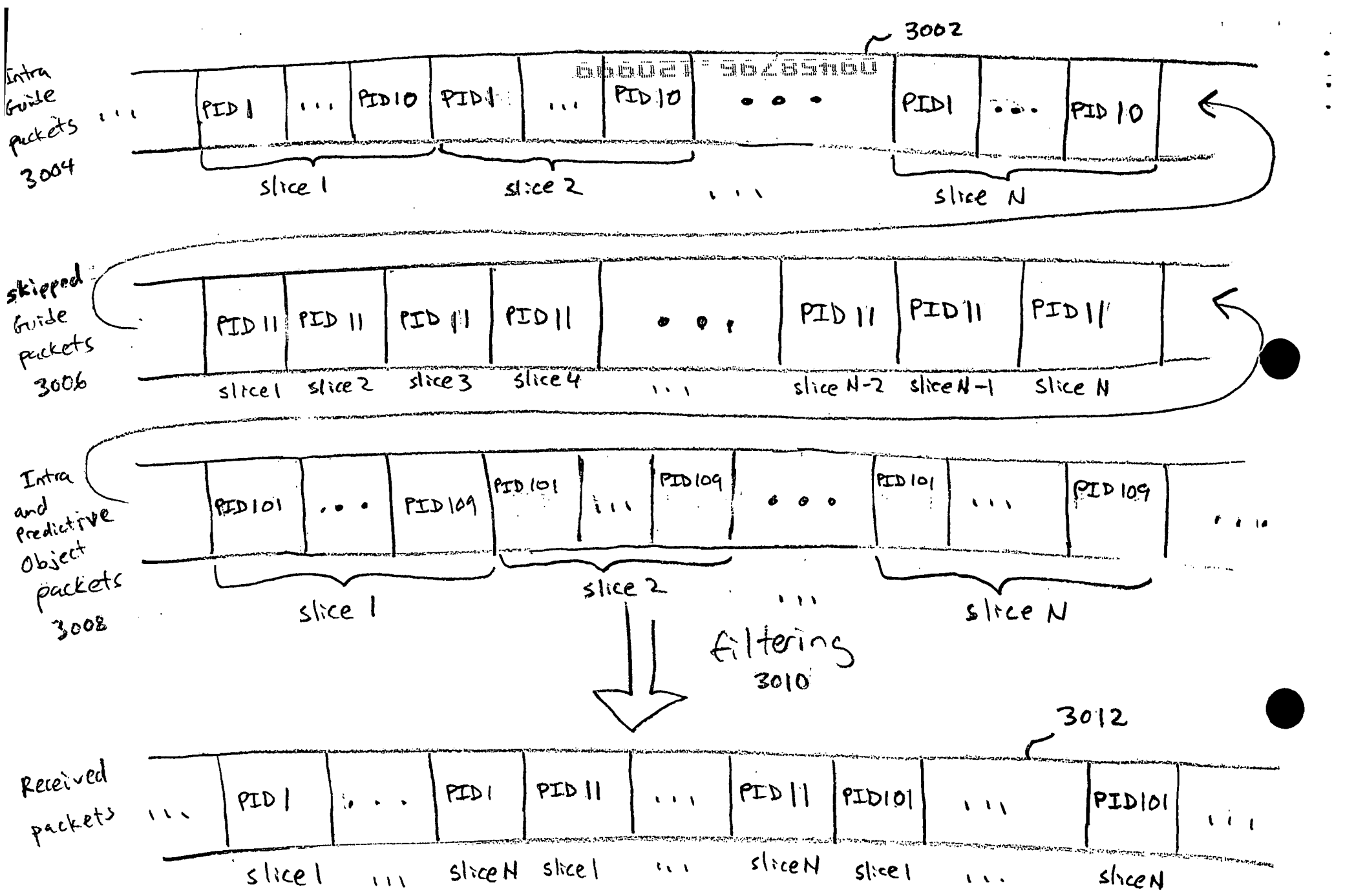
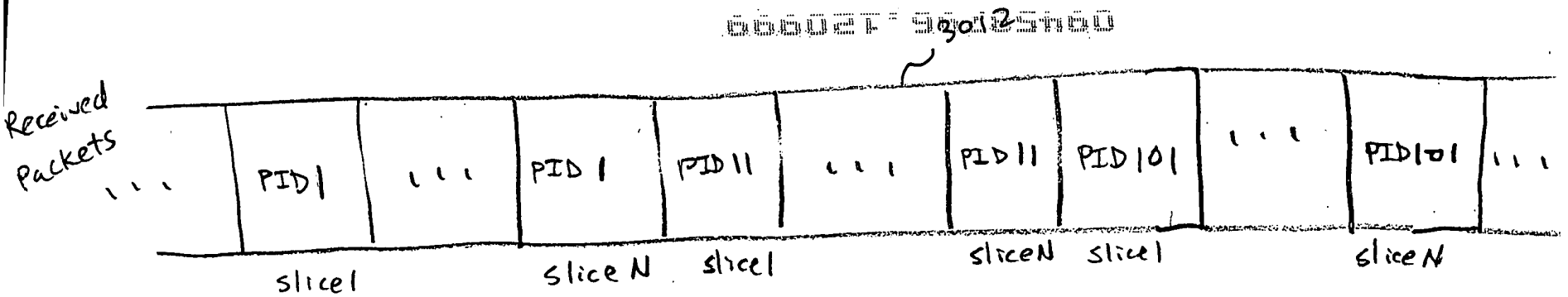

3002
Intra Guide packets 3004
PID 1
PID 10
PID 1
PID 10
PID 1
PID 10
slice 1
slice 2
slice N
skipped Guide packets 3006
PID 11
slice 1
slice 2
slice 3
slice 4
slice N-2
slice N-1
slice N
Intra and Predictive Object packets 3008
PID 101
PID 109
slice 1
slice 2
slice N
filtering 3010
3012
Received packets
PID 1
PID 11
PID 101
slice 1
slice N

Fig. 30



Slice Recombination 3102

PID 1/S1	PID 101/S1
PID 1/S2	PID 101/S2
PID 1/S3	PID 101/S3
⋮	⋮
PID 1/SN	PID 101/SN

Intra-Coded Frame 3104

PID 11/S1	PID 101/S1
PID 11/S2	PID 101/S2
PID 11/S3	PID 101/S3
⋮	⋮
PID 11/SN	PID 101/SN

Predictive-Coded Frames 3106

Fig. 31

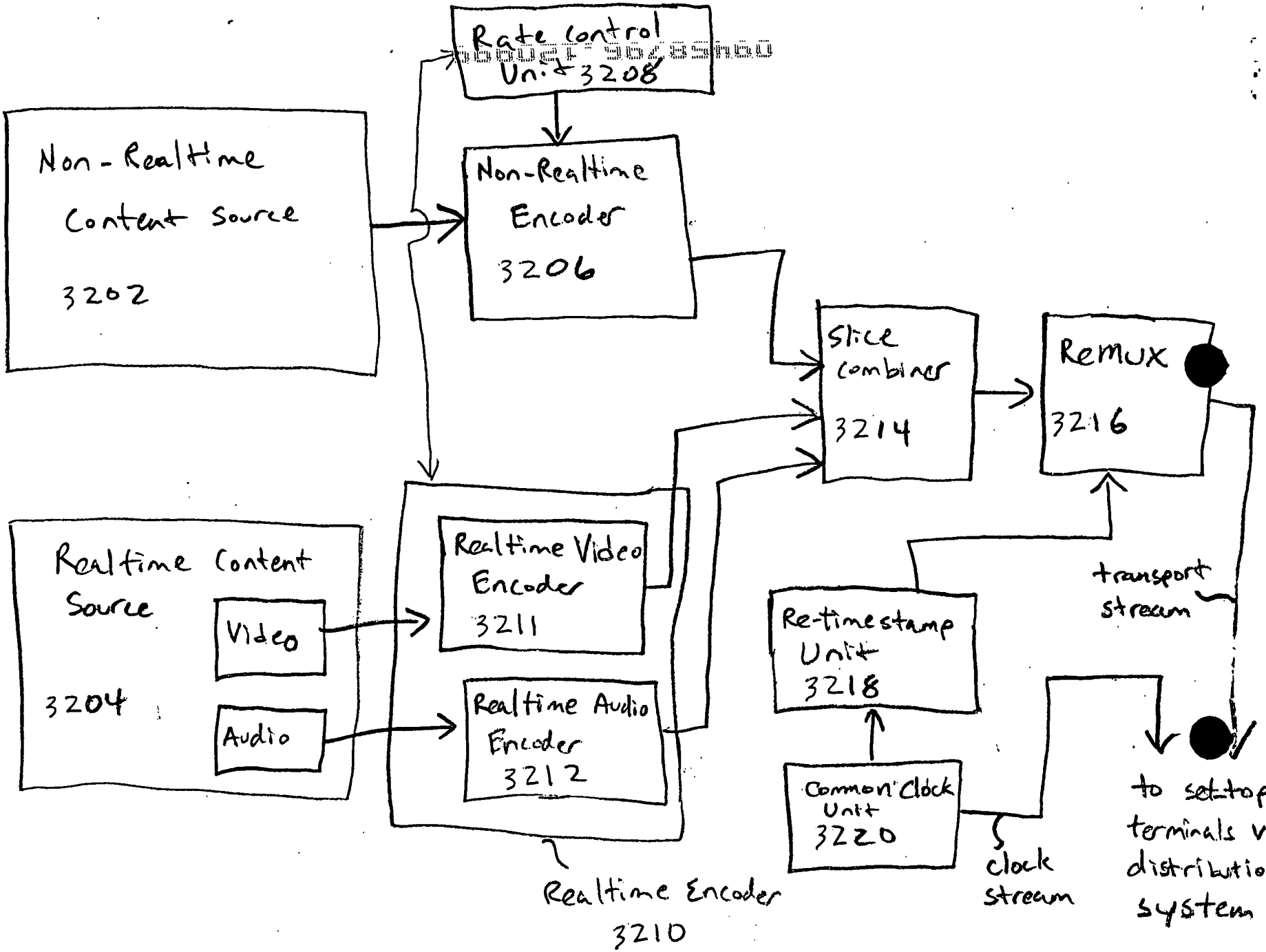


Fig. 32

Re-timestamping and Rate Control Apparatus